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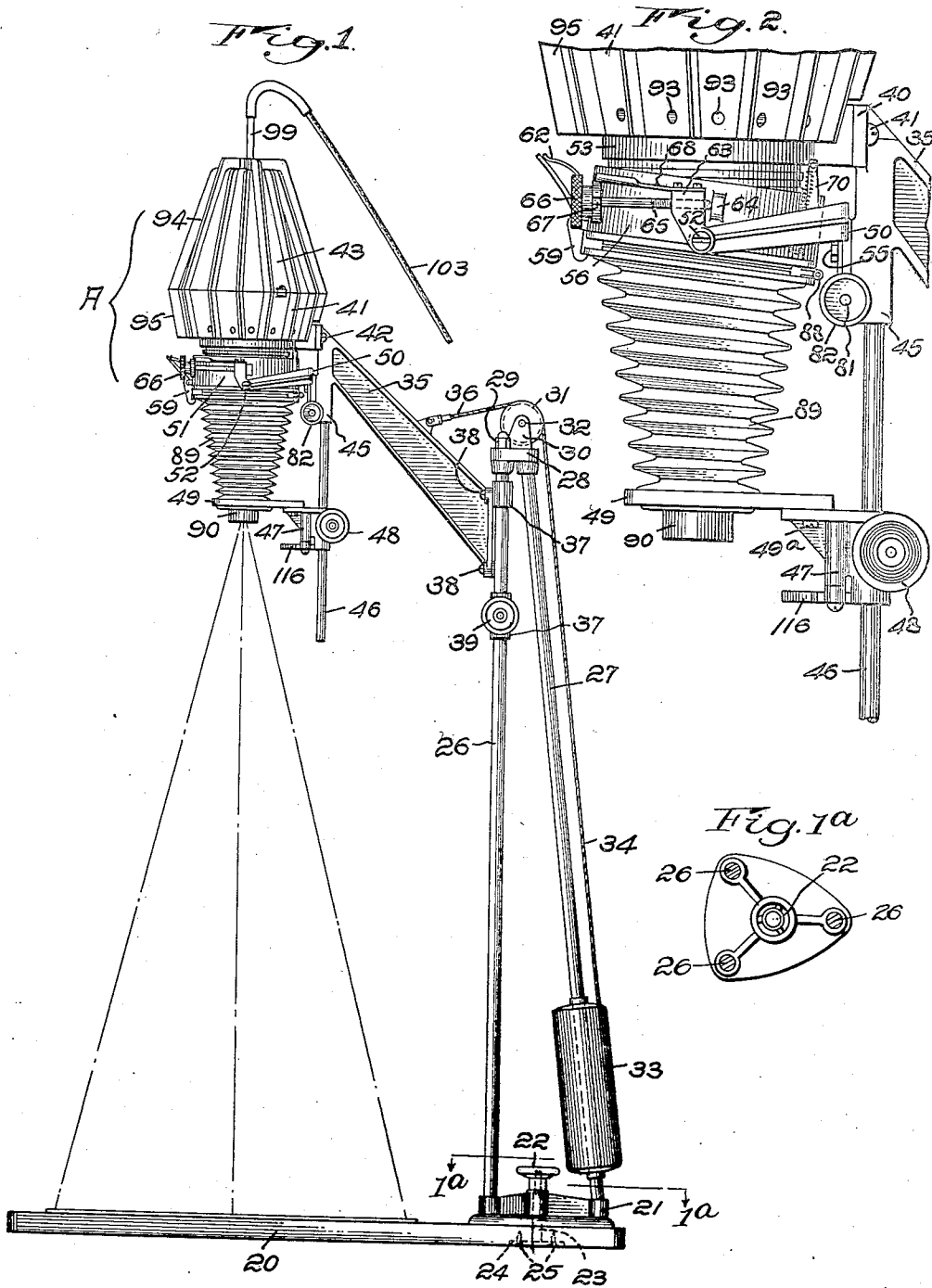
C. R. SKINNER ET AL

2,236,303

PHOTOGRAPHIC PRINTER FOR RESTITUTIONAL, ENLARGING, AND OTHER PURPOSES

Filed Nov. 25, 1939

3 Sheets-Sheet 1



INVENTORS
Clifton R. Skinner
 BY *Frederick P. Willcox*
Emory, Booth, Townsend, Miller and Leitchman.
 THEIR ATTORNEYS

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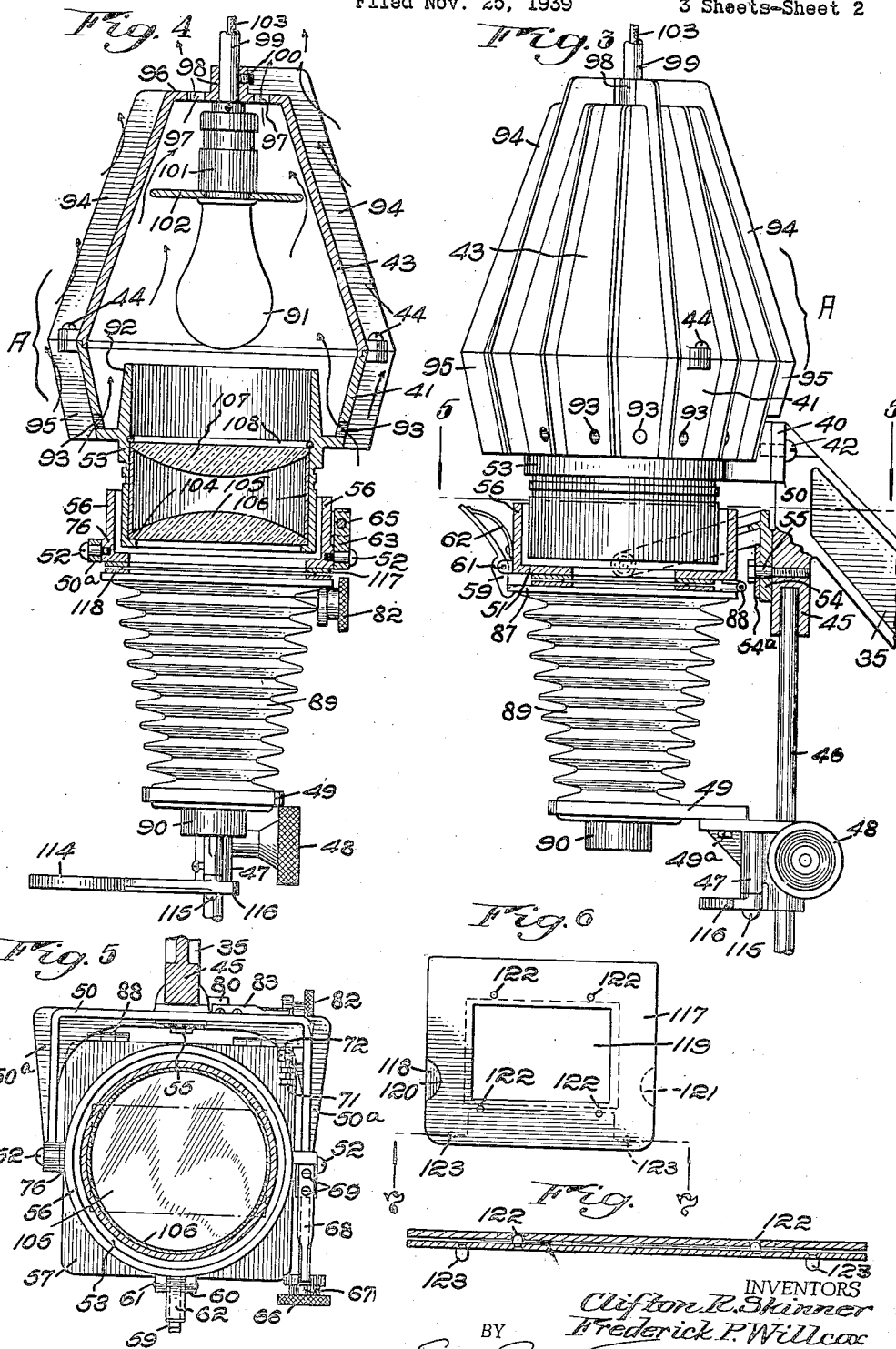
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3 Sheets-Sheet 2



INVENTORS
Clifton R. Skinner
Frederick P. Willcox
 BY
Emory Booth, Thomas Miller and Frederick
their ATTORNEYS

March 25, 1941.

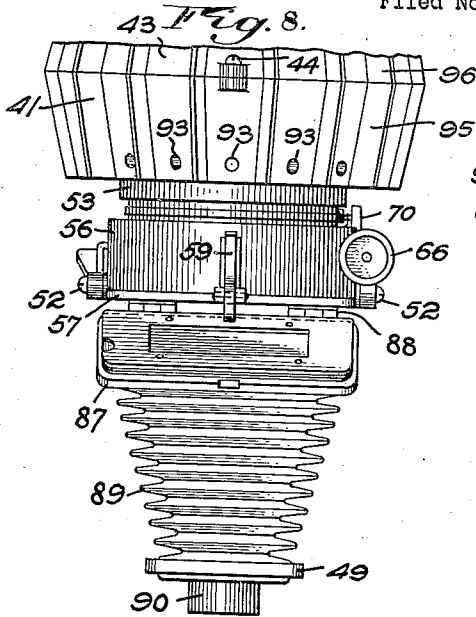
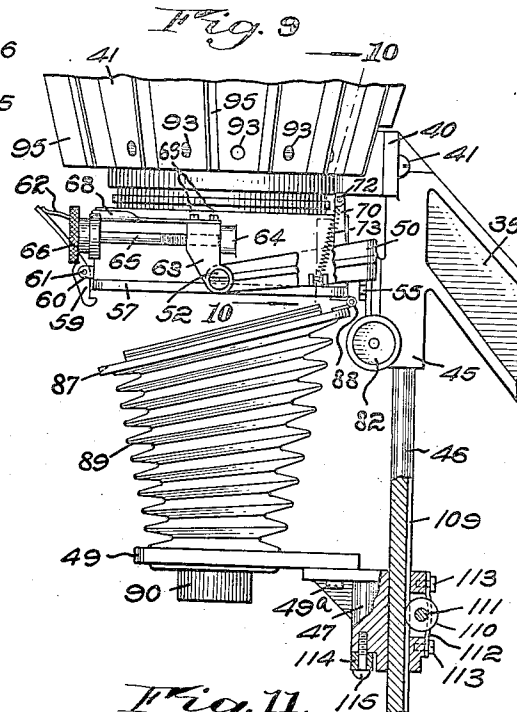
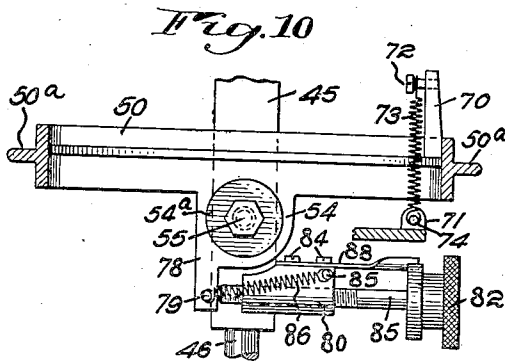
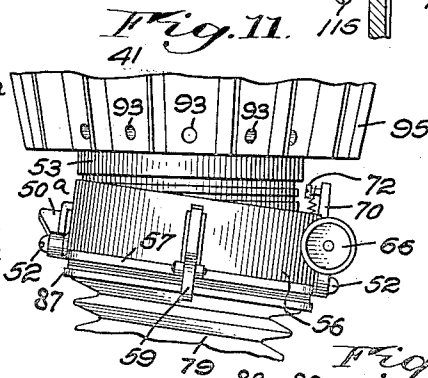
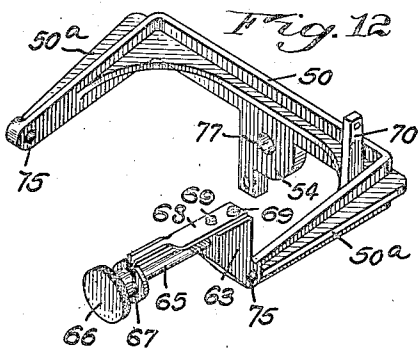
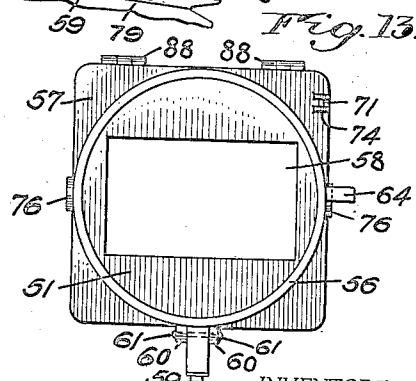
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3 Sheets-Sheet 3



INVENTORS
Clifton R. Skinner
Frederick P. Willcox
 BY
Emory, Booth, Townsend, Miller & Swindner,
 Their ATTORNEYS

UNITED STATES PATENT OFFICE

2,236,303

PHOTOGRAPHIC PRINTER FOR RESTITUTIONAL, ENLARGING, AND OTHER PURPOSES

Clifton R. Skinner and Frederick P. Willcox, San Francisco, Calif., assignors to The Folmer Graflex Corporation, Rochester, N. Y., a corporation of Delaware

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24 Claims. (Cl. 88—24)

This invention relates to improvements in projection printers for photographic purposes, 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 drawings, wherein—

Fig. 1 is a side elevation of the enlarger or printer with the enlarging head moved all the way to the top of its supporting structure and exemplifying the snubbing action of the counterweight;

Fig. 1a is a small detail in cross section on the line 1a—1a of Fig. 1;

Fig. 2 is an enlarged side elevation of the upper 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;

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

Fig. 5 is a horizontal section taken through Fig. 3 on the line 5—5 of that figure;

Fig. 6 is a top plan view of one of the negative holders of the printer or enlarger;

Fig. 7 is a vertical section taken through Fig. 6 on the irregular line 7—7 of that figure;

Fig. 8 is an enlarged front elevation of the enlarger head showing part of the lamp house broken away and also showing the lower negative platen open;

Fig. 9 is a side elevation of Fig. 8, showing the focusing mechanism in vertical section;

Fig. 10 is a vertical section taken through Fig. 9 on the line 10—10 thereof, showing the means for adjusting the gimbal-like mount;

Fig. 11 is a detail in front elevation showing the restitutional adjustment means when tilted sideways;

Fig. 12 is an enlarged detail of the gimbal-like mount of the printer or enlarger; and

Fig. 13 is a plan view of the upper platen of the printer or enlarger.

It is an important purpose of our invention to provide a photographic printer that may be used as an enlarger or otherwise, and that is easy to operate, has great rigidity of parts and is rela-

tively simple in construction. Among other important objects of the invention is the provision of a printer, whether for enlarging or for reducing, that is provided with means to adjust readily the plane of the negative with respect to the objective lens, for the purpose of correcting distortion that may exist in the negative or for the purpose of creating distortion. Other important objects of the invention will appear in the detailed description of the selected embodiment of the invention to which, however, our invention is in no wise restricted, the scope thereof appearing from the subjoined claims.

Referring more particularly to the drawings of said selected embodiment, and first to Figs. 1 and 1a, the supporting base or paper board is represented at 20, it having attached thereto a casting 21 held to the paper board or base 20 by means of a hand wheel 22 that is threaded on a stud 23 shown in dotted lines in Fig. 1. The said stud 23 is in turn held to the base or paper board 20 by a disk 24 that is riveted to the stud 23. The entire assembly is held to the paper board 20 by means of screws 25.

Into the casting 21 are fitted two vertical rods 26, one of which is shown in side elevation in Fig. 1, and both of which are shown in horizontal section in Fig. 1a. A third rod 27 is also fitted into the casting 21 and is supported at a slight angle with respect to the two vertical rods 26, 26. The said three rods 26, 26, 27, are joined into a second or upper casting 28 and are held thereto by nuts 29, thus making a very rigid tripod structure. The said casting 28 has two upwardly extending arms 30, 30 between which is placed a pulley 31 having a pivot 32. Slidably mounted on the slightly inclined rod 27 is a counterweight 33 having a cable 34 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 casting 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, 3 and 9, 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 Figs. 4, 8 and 11.

As best shown in Figs. 2, 3, 4, etc., 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 shown in detail in Fig. 13, and is there represented as provided with a cylindrical extension or member 56 upstanding from a flat rectangular portion 57 having a central opening 58 and a latch 59 that is carried by bosses 60, 60 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, 3 and 9.

The said yoke 50, as shown in Figs. 9 to 13, is provided with an upstanding boss 63. The upper platen cylindrical extension 56 is provided with a laterally extending boss 64 shown in Fig. 9. 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.

Also attached to the said boss 63 is a spring member 68, shown in Figs. 9 and 12, as held to the boss 63 by means of screws 69, 69. The said yoke 50 has an upwardly extending member or part 70 that is best shown in Fig. 12. The said upper negative platen structure 51 is provided with a boss 71 that is best shown in Fig. 13, and is also shown in partial section in Fig. 10. The said member 70 is also provided with a shoulder pin 72 to which is attached a spring 73 also attached to the boss 71 by means of a pin 74, most clearly appearing in Fig. 10.

As will best appear from Figs. 2 and 9, if the adjusting knob 66 be turned in a clockwise direction, the shaft or rod 65 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 the spring 73. If the said knob 66 be turned in a counterclockwise 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 the said spring 73.

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.

As shown in Fig. 4 when taken with Fig. 12, each shoulder screw 52 passes through a hole 75 in the yoke 50 and engages a threaded boss 76 of the upper cylindrical platen extension or member 56 of the said upper platen structure 51. The pad or boss 54 of the yoke 50 is provided with a hole 77, shown in Fig. 12, through which passes the shoulder screw 55 previously referred to, the latter being threaded into the downwardly extending member 45 of the bracket or arm 35. The said shoulder screw 55 is also provided with a washer 54a furnishing additional support for the yoke 50.

Referring particularly to Figs. 10, 11 and 12, the boss 64 is provided, as shown in Fig. 10, with an arm 78 having a pin 79. The member 45 of the lamp house bracket or arm 35 is also provided with a boss 80, shown in Fig. 10, into which is threaded a shaft 81 having a knob 82. Also attached to boss 80 is a flat spring 83 by means of screws 84, 84. The boss 80 is provided with a pin 85. Attached to the pin 79 of said arm 78 and to the pin 85 of the boss 80 is a coiled spring 86, causing the said arm 78 to remain in contact with the end of the right hand threaded shaft 81. When the knob 82 is turned in a clockwise direction, the arm 78, hub 54 and yoke 50 are caused to swing in a clockwise direction around the screw 55, at the same time putting tension on the spring 86. When the knob 82 is turned in a counterclockwise direction, thus withdrawing the threaded shaft 81 from the face of the arm 78, the said spring 86 causes the yoke 50 to be swung in a counterclockwise direction. Since the upper platen 51 is attached to the yoke 50, said upper platen 51 is caused to swing in a like manner. In this manner, the position of the said upper platen is adjusted at right angles to the swing previously described in connection with the knob 66 in a lateral direction.

It will thus clearly be seen that 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, as shown in Figs. 9 and 13. The said lower platen 87 is held in a closed position, as shown in Figs. 1, 2, 3 and 11 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. 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 said upper section 43 of the lamp house A is provided with a flat 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 90 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, and the detailed structure of which is shown in vertical section in Fig. 9.

As shown in the latter figure, the lower end of the lens carrier rod 46 is represented in vertical section and is there shown as having a vertically extending key-way 109 in which rides a disk 110. In practice the side walls of the said key-way have a slight taper toward each other and the focusing disk 110 has a corresponding taper. The said disk 110 is attached to a very short shaft 111 and is held in contact with the lens carrier rod 46 by means of a spring 112 bearing upon the said short shaft 111, the latter being integral with the focusing knob 48. The spring 112 is attached to the focusing member 47 by means of screws 113, 113.

If the focusing knob 48 is turned, the shaft 111 and the focusing disk 110 will also be caused to turn. Since the said focusing disk 110 rides in the key-way 109, the walls of which are provided with tapered sides and the disk 110 being also provided with tapered sides that fit into the said key-way 109, any movement of the disk 110 will cause the focusing member 47 to be moved along

the lens carrier rod 46. It is noted that the said rod 46 is represented as broken away at its lower end in Figs. 2, 3, 4 and 9, but it 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 90 with respect to the base or paper support 20. 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 33 is moved along the slightly inclined rod 27. If the counterweight 33 is elevated to or substantially to the upper end of the said rod 27, the lamp house A and the supporting parts are correspondingly lowered.

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 90 and the distance of that lens from the paper upon the base or support 20. Thus, the print may be an enlargement or a reduction or of the same size as the negative.

When the focusing knob 46 is turned in a clockwise direction, the disk 110 will also be turned in a clockwise direction, thus causing the focusing member 47 to be moved upward on the lens carrier rod 46, thereby moving the objective lens 90 in an upward direction.

It will be evident from the foregoing description that we have provided means for moving the said objective lens 90 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. Attached to the said member is a filter holder 114, best shown in Fig. 4. It is held fast to the focusing member 47 by means of a shoulder screw 115, shown in section in Fig. 9. The said filter holder 114 is provided with a laterally extending end 116 that contacts with the lower end of the said focusing member 47 when the said filter holder 114 is swung into position directly under the objective lens 90. The said filter holder 114 may be of any well known construction carrying, if desired, a single filter for use in focusing the lens, or it may carry a set of three filters for use in making three-color separations.

In Figs. 5 and 6, there is shown in detail the construction of the negative carrier. This is made up of an upper member 117 and a lower member 118 together provided with an opening 119 centrally positioned. There are also preferably provided notches 120 in the upper member of the carrier and notches 121 in the lower member of the said carrier, said latter notches being indicated in dotted lines in Fig. 6. The said notches are provided in order to facilitate the separation of the said two members 117, 118. In the said lower member 118, there are preferably provided a series of four pins 122, 123 for the purpose of positioning the negative in the negative carrier composed of the said two members. In the said lower member 118, of the negative carrier, are preferably provided additional pins or dowels 123, 123, the purpose whereof is to secure the proper location of the negative carrier on the lower platen 87 in suitable holes (not shown).

In Figs. 8 and 9, the lower platen 87, hinged at 88, and the negative carrier 117, 118 are shown in place. The disclosed construction is such as to permit any dust or dirt that may be on the negative to be readily brushed off when the nega-

tive is in position. By swinging the lower platen 87 upwardly, the said lower platen is engaged by the platen latch 59, thus holding the negative carrier 117, 118 in proper position, as best shown in Figs. 2, 3 and 4. It will be observed that the bellows 89 is at all times supported at its lower end by and upon the lens support proper 49. The construction is such as to permit the platen latch 59 to be disengaged and the bellows moved into the position shown in Fig. 9, for the purpose stated, but without disturbing the focusing adjustment.

In order to remove the negative, it is merely necessary to release the latch 59, whereupon the lower platen 87 can be swung downwardly and the negative carrier 117, 118 will thus be removed from the said lower platen 87. In some cases it may not be desirable to provide the negative carrier with the locating dowels or pins 122, 123, and in such case the negative carrier plates 117, 118 may be moved around into any desired position on the lower platen 87, thus allowing a different portion of the negative to be centered over the lens 90.

The said negative carrier, made up in the present embodiment of the invention of the plates 117, 118, may be provided with different openings 119, in order to accommodate different negative sizes, and the said plates 117, 118, which constitute the negative carrier, may be hinged together, thus forming a book-like structure. Such a construction is of some advantage when using the negative carrier in the dark room, since then both parts of the negative carrier would at all times be coupled together. In the disclosed embodiment of the invention, they are, however, shown as entirely separate or separable parts. The said negative carrier may also be provided with glass in the event that the operator wishes to use a negative carrier of such type.

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 disclosed invention provides means for changing the position of the negative carrier with respect to the central or vertical axis of the lens 90. Heretofore the negative has, so far as we are aware, always been held in a plane at right angles to such an axis, and a great majority of the cameras today manufactured have no means for correcting distortion that occurs because the camera is tilted upward or sideways to include all the material wanted on the photograph when taking the picture.

In the disclosed embodiment of the invention, the negative when supported in the negative carrier may be tilted either upon the two opposite screws 82 or upon the screw 85 (positioned at right angles to an imaginary line drawn through the said screw 82, as clearly shown in Fig. 5), or it may be tilted simultaneously upon all three of said supports in a manner generally similar to a gimbal-ring construction. It will be evident that in this manner any corner of the negative may be tilted up or down, or either half of the negative may be tilted up or down, with an opposite movement of the opposite corner or opposite half of the negative, thus in effect tilting the negative about the vertical axis of the objective lens 90. In this manner, any distortion that exists in the negative can be corrected in the print, or conversely, distortion may be created in the print

from a perfect negative, or perfect prints may be made from a perfect negative.

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, such as 33, 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 20 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 the 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, as is evident from Figs. 8 and 9.

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. Therefore, while in certain of the claims we have referred to an upper negative platen structure and to a lower negative platen structure, it is to be understood that these terms are used generically and as meaning respectively the platen structure nearer to and the platen structure further from the lamp house.

Having thus described one illustrative embodi-

ment 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 photographic printer, for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder with means to maintain said negative holder in operative relation to said light-modifying means, means to support an objective lens between the light-modifying means and the print, means so to support the lamp house and the negative holder with relation to each other that a free air space is provided between said lamp house and said negative holder, to prevent overheating said negative holder being tiltable upon its said support about a transverse axis, thereby to vary the plane of the supported negative with respect to the objective lens, without disconnecting said negative holder from its said supported relation to the lamp house.

2. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, and a negative holder with means to maintain it in operative relation to said light-modifying means, said negative holder having a part extending therefrom about and overlapping the light-modifying means but out of contact therewith said maintaining means including means connected to said extending part for tilting the negative holder about an axis transverse to said negative holder, so as to vary the plane of the supported negative with respect to the objective lens.

3. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, and a negative holder with means to maintain it out of contact with said lamp house but in operative relation to the light-modifying means thereof, combined with means for adjusting said negative holder while so maintained, angularly with respect to a plane extending transversely through the light-modifying means.

4. A photographic printer, for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder, means to support the same upon said supporting means for the lamp house in proximity to said lamp house but spaced therefrom, to tilt about a transverse axis of said negative holder, and associated supporting means for said negative holder to permit said negative holder to tilt about another transverse axis thereof at substantially right angles to said first axis.

5. A photographic printer, for restitutional, for enlarging, and for other photographic printing

purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder, and means connected to said supporting means for the lamp house to support said negative holder in operative proximity to said lamp house and including two opposite members on which the said negative holder may tilt on a transverse axis, and an additional support for said holder upon which said holder may also tilt on another transverse axis, whereby the plane of the said negative holder may be changed separately or conjointly about either or both of two different transverse axes.

6. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and a supporting yoke therefor carried by the supporting means for said lamp house, said yoke having opposed arms, and means mounted therein for supporting said negative holder for tilting movement in operative proximity to the light-modifying means of said lamp house.

7. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and a supporting yoke therefor carried by the supporting means for said lamp house, said yoke having opposed arms, and means mounted therein for supporting said negative holder for tilting movement in operative proximity to the light-modifying means of said lamp house, said yoke also having between said arms means to support said negative holder for tilting upon a second transverse axis whereby the plane of the supported negative with respect to the objective lens may be varied about either or both of said transverse axes.

8. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, upper and lower negative platen structures, supported by said supporting means for the lamp house in operative proximity to but spaced from said lamp house, and openable without disconnection from or contact with said supporting means, to permit the insertion of a negative or negative holder.

9. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, upper and lower negative platen structures, supported by said supporting means for the lamp house in operative proximity to but spaced from said lamp house, and openable without disconnection from or contact with said supporting means, to permit the insertion of a negative or negative holder, and

a negative carrier received between said platen structures, and including two flat members having means for attaching them together at one edge.

10. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, upper and lower negative platen structures, supported by said supporting means for the lamp house in operative proximity to but spaced from said lamp house, and openable without disconnection from or contact with said supporting means, to permit the insertion of a negative or negative holder, and a negative carrier receivable between said platen structures, said lower platen structure having a bellows connected thereto, and means for latching together said platen structures.

11. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure 51 and means to support the same so as to provide a free air space between it and the lamp house, and a lower platen structure 57 detachably connected to the upper platen structure so as to receive the negative holder therebetween said upper platen structure having at one or more edges thereof, as a part of the means to support the same, means providing a transverse axis for said upper platen structure, the said upper platen structure being tiltable upon said axis without making contact thereof with the lamp house.

12. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means; said maintaining means including an upper negative platen structure having an extension surrounding but spaced from the light-modifying means and a lower platen structure connected to said upper platen structure and carrying a bellows.

13. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure having an extension surrounding but spaced from the light-modifying means and a lower platen structure connected to said upper platen structure, a bellows carried by said lower platen structure, a lens-support connected to the outer end of said bellows, and means whereon said lens-support is mounted so as to permit the temporary separation of the two platen struc-

tures for insertion or removal of the negative holder without separation of the said bellows from the lens-support.

14. A photographic printer for restitutional, 5 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to 10 hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure 51 having a hollow portion extending upwardly so as to surround and overlap the light-modifying means without contact there- 15 with, and a lower platen structure 87 mounted so as to be swung away from the upper platen structure for handling the negative holder.

15. A photographic printer for restitutional, 20 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp 25 house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in a position surrounding but out of contact with said light-modifying means for tilting said negative 30 holder, such means including a member 56 having a lateral formation 64, a yoke 50 pivotally mounted upon said member 56, and an adjusting shaft or screw 65 threaded into said yoke and having contact with said lateral formation 64.

16. A photographic printer for restitutional, 35 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp 40 house, supporting means for said lamp house to hold the same with relation to the print, a negative holder having a part which surrounds and overlaps the light-modifying means without contact therewith, said negative holder having 45 two parts hinged together and adapted to receive the negative carrier therebetween, with means for securing said hinged parts together for the printing operation.

17. A photographic printer for restitutional, 50 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to 55 hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part 60 of the lamp house having the light-modifying means, and means to support said platen structure to tilt upon a transverse axis.

18. A photographic printer for restitutional, 65 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to 70 hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure positioned in proximity to but 75 spaced from and non-contacting with the part

of the lamp house having the light-modifying means, and means to support said platen structure to tilt upon a transverse axis, and also a second transverse axis which is at substantially right angles to said first axis.

19. A photographic printer for restitutional 5 for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp 10 house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said 15 maintaining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light-modifying means, and means to support said platen struc- 20 ture to tilt upon a transverse axis, and a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the inser- 25 tion of the negative or negative holder between said two platen structures.

20. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp 30 house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said main- 35 taining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light-modifying means, and means to support said platen structure to 40 tilt upon a transverse axis, and a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the insertion of the negative or negative holder between the said two 45 platen structures, and a bellows attached to said lower negative platen structure.

21. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means 50 mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining 55 means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light modifying means, and means to support said platen structure to tilt 60 upon a transverse axis, and a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the insertion of the negative or negative holder between said two 65 platen structures, and a bellows carrying an objective lens attached to said lower negative platen structure, and means carried by the supporting means for the lamp house for adjusting said bellows and lens for focusing purposes while at- 70 tached to said lower negative platen structure.

22. A photographic printer for restitutional, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means 75

mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light-modifying means, a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the insertion of the negative or negative holder between said two platen structures, means to support said upper negative platen structure upon two transverse axes thereof in said position, and means permitting manual adjustment of said upper negative platen structure about either of said two transverse axes for varying the plane of the supported negative with respect to the objective lens.

23. A photographic printer for restitutorial, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light-modifying means, a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the insertion of the negative or negative holder between said two platen structures, means to support said upper negative platen structure upon two transverse axes thereof in said position, and means permitting manual adjustment of said upper negative platen structure about either of said two transverse axes for varying the plane of the supported negative with respect to the objective lens, said upper negative platen structure having an extension about but spaced from the end of said lamp house that has the light-modifying means mounted therein, said extension having connected thereto the said means for supporting said upper negative platen structure upon two transverse axes thereof, and said ex-

tension being so spaced from the lamp house that in all tilting adjustments of the upper negative platen structure the said extension is out of contact with said lamp house.

24. A photographic printer for restitutorial, for enlarging, and for other photographic printing purposes, having in combination; a light source, a lamp house therefor, light-modifying means mounted at one end portion of said lamp house, supporting means for said lamp house to hold the same with relation to the print, a negative holder and means to maintain it in operative relation to the light-modifying means, said maintaining means including an upper negative platen structure positioned in proximity to but spaced from and non-contacting with the part of the lamp house having the light-modifying means, a lower negative platen structure connected to said upper negative platen structure but openable without disconnection therefrom to permit the insertion of the negative or negative holder between said two platen structures, means to support said upper negative platen structure upon two transverse axes thereof in said position, and means permitting manual adjustment of said upper negative platen structure about either of said two transverse axes for varying the plane of the supported negative with respect to the objective lens, said upper negative platen structure having an extension about but spaced from the end of said lamp house that has the light-modifying means mounted therein, said extension having connected thereto the said means for supporting said upper negative platen structure upon two transverse axes thereof, and said extension being so spaced from the lamp house that in all tilting adjustments of the upper negative platen structure the said extension is out of contact with said lamp house, said lower negative platen structure being connected to the said upper negative platen structure and having a bellows carried thereto, together with means to support said bellows from the supporting means for the lamp house, the said structure being such that the upper negative platen structure may be adjustably tilted about either or both of said transverse axes without said extension contacting with said lamp house and without disconnecting said bellows from the said supporting means for the lamp house.

CLIFTON R. SKINNER.
FREDERICK P. WILLCOX.