

Oct. 28, 1941.

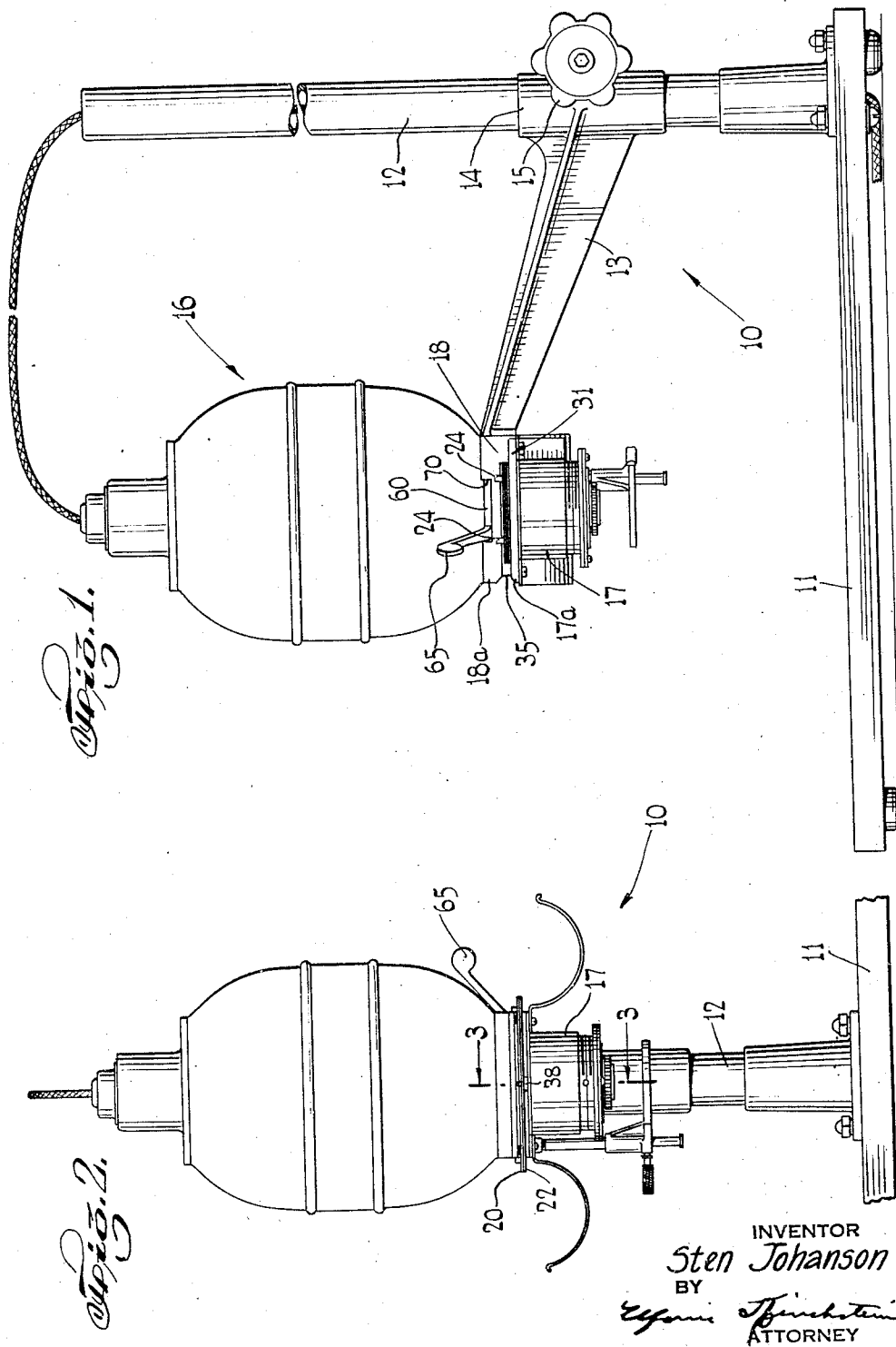
S. JOHANSON

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PHOTOGRAPHIC ENLARGING APPARATUS

Filed April 1, 1940

2 Sheets-Sheet 1



Oct. 28, 1941.

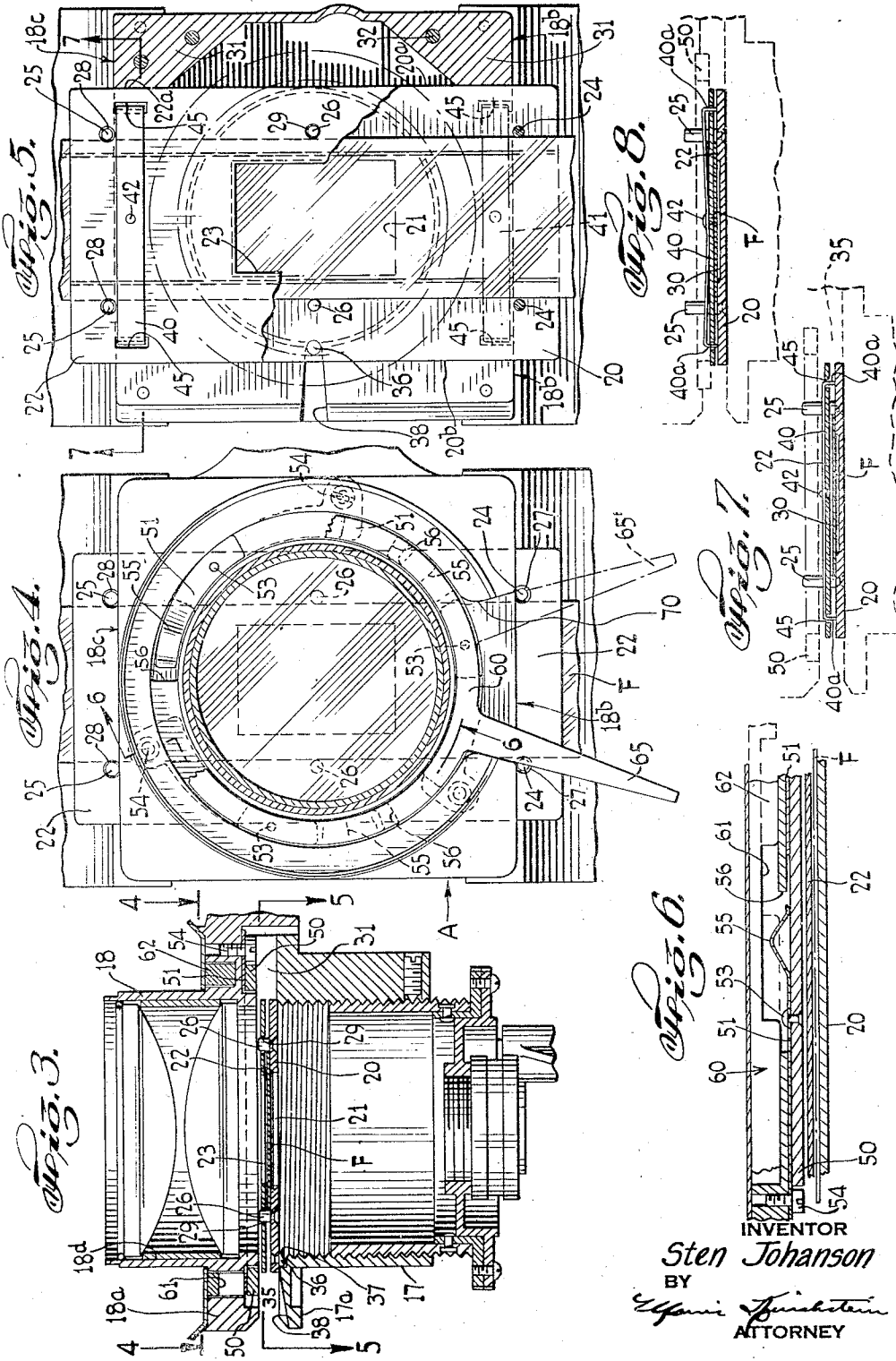
S. JOHANSON

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2 Sheets-Sheet 2



INVENTOR
Sten Johanson
BY
Harris J. J. J. J. J.
ATTORNEY

UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC ENLARGING APPARATUS

Sten Johanson, New York, N. Y., assignor to
Universal Camera Corporation, New York,
N. Y., a corporation of Delaware

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15 Claims. (Cl. 88—24)

This invention relates generally to photographic enlarging apparatus. More particularly, this invention relates to an improved construction for a negative carrier adapted for use in such enlarging apparatus.

One of the objects of this invention is to provide for use in a photographic enlarging apparatus of the character described an improved negative carrier comprising a pair of plates in which novel spring means are provided for normally maintaining the said plates in spaced relationship in combination with novel means for clamping the plates together against the action of such spring.

Another object of this invention is to provide a negative carrier of the character described which shall be characterized by its simplicity of operation and design and by its novel constructional features, which shall be relatively inexpensive to manufacture and which at the same time shall represent an important advance in the art.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of this invention,

Fig. 1 is a side elevational view of a photographic enlarger embodying this invention;

Fig. 2 is a front elevational view thereof;

Fig. 3 is an enlarged cross-sectional view taken substantially on the line 3—3 of Fig. 2;

Figs. 4 and 5 are cross-sectional views taken substantially along the lines 4—4 and 5—5 respectively of Fig. 3;

Fig. 6 is a cross-sectional view taken substantially on the line 6—6 of Fig. 4;

Fig. 7 is a cross-sectional view taken substantially on the line 7—7 of Fig. 5; and

Fig. 8 is a view similar to Fig. 7 but illustrating a step in the operation thereof.

Referring now in detail to the drawings, there is disclosed in Figs. 1 and 2 a photographic enlarger 10 comprising generally a base member 11 having mounted thereon and disposed at one end thereof an upright standard 12, on which is slidably mounted a supporting arm 13, the said arm 13 being adapted to be adjustably moved along the standard 12. The arm 13 is provided with a split bearing portion 14, which is

adapted to frictionally engage the standard in any selected position along the length thereof, by means of a screw member 15 of customary construction and design. The arm 13 is adapted to support a lamp housing member 16, a lens housing member 17 and a cooperating member 18 forming a support for the negative carrier.

In accordance with my invention, I have provided a negative carrier shown in Figs. 3 to 8, comprising a lower plate 20 having an aperture 21 and an upper plate 22 having an aperture 23. The plates 20 and 22 are maintained in correct relationship, i. e. with the apertures 21 and 23 in substantial register with each other, by means of the pairs of locating pins 24, 25 and 26 rigidly attached to the lower plate 20 and projecting upwardly therefrom and which are freely received in corresponding pairs of openings 27, 28 and 29 respectively in the upper plate 22. The lower plate 20 is provided with a shallow recessed portion 30 running lengthwise thereof and is of such width as to correspond to the exposed emulsion on a film F carrying photographic images which it is desired to enlarge. This will prevent scratching of the emulsion when the film is properly placed in the carrier.

It is noted that the pairs of pins 24, 25 and 26 are symmetrically positioned on opposite sides of the recess 30 so as to serve as guides for the film F, and to limit its lateral displacement.

The end pairs of pins 24 and 25 are preferably made longer than the intermediate pairs of pins 26, in order that they may additionally serve as guides for properly mounting the negative carrier plates 20 and 22 on the support 18 of the enlarger 10. As clearly shown in Figures 3 to 5 of the drawings, the negative carrier support comprises an upper rectangular flange portion 18a which may be integral with the projecting tubular portion or support 18. The pairs of pins 24 and 25 are so spaced apart from each other longitudinally of the plates 20 and 22 that they will be disposed in slidable contacting relationship with the opposite edges 18b and 18c of the rectangular portion 18a. The said portion 18a is provided with a pair of raised shoulders 31, to which there is attached by any suitable attaching means, such as for example the screws 32, a cooperating member 17, having a portion 17a thereof, similar in size and shape to that of the portion 18a. Due to the fact that the shoulders 31 are raised, a slotted space 35 will thus be provided between the portions 17a and 18a, into which the negative carrier plates 20 and 22 are adapted to be received. The said plates 20 and

22 are adapted to be inserted in the space 35 from the open end of said space in the direction of the arrow A (see Fig. 4) and are slidably moved in the direction of the said arrow A until the longitudinal edges 20a and 22a of the plate 20 and 22 respectively about the shoulders 31. In such latter position the apertures 21 and 23 are in proper optical alignment with the lenses and the light source. To prevent lateral displacement of the plates 20 and 22 in a direction away from their proper position against the shoulders 31, as shown in Figures 3 and 5, the lower plate 20 is provided with a locking pin 36 located midway between the transverse ends thereof and adjacent the longitudinal edge 20b projecting downwardly therefrom in the opposite direction from that of the pairs of pins 24, 25 and 26.

An inner recessed shoulder 37 is provided in the portion 17a (see Fig. 3) in to which the locking pin 36 will drop due to the action of the weight of the plates 20 and 22. A transverse inclined groove 38 in the surface of the portion 17a permits the free movement of the locking pin 36 while the plates 20 and 22 are being slidably received in the space 35. When the pin 36 has dropped into the recessed shoulder 37, the plates will then be locked in position. To remove the said plates 20 and 22 from the space 35, it is necessary to raise the plate 20 a sufficient amount to withdraw the pin 36 from its recess 37.

In accordance with this invention the following means are employed for normally maintaining the plates 20 and 22 as in Figure 7 in spaced relationship from each other a sufficient amount to permit the insertion and longitudinal movement of the film F therebetween, so that the photographic image which it is desired to enlarge may be selectively positioned between the apertures 21 and 23.

Attached to the upper plate 22 and spaced from each other on opposite sides of the aperture 21 are a pair of transversely disposed spring members 40 and 41. The said members 40 and 41, which may be made of flat spring material, are fixedly attached to the upper plate 22 by any suitable attaching means known to the art, such as for example the hollow rivets 42 disposed intermediate the ends of the members 40 and 41, leaving the said ends free. The said springs 40 and 41 overlie the top surface of the plate 22 and are resiliently urged in a direction toward the said plate 22 due to the rivets 42. Portions 40a and 41a adjacent the said free ends of the members 40 and 41 are bent over at right angles to the plane of said members, the said bent over portions 40a and 41a freely projecting through slotted openings 45 in the plate 22. The last named bent ends 40a and 41a are adapted to rest upon the lower plate 20, to thus normally resiliently space the upper plate 22 from the lower plate 20, as in Fig. 7.

For bringing the plates 20 and 22 together, so as to clamp the film F therebetween in any selected position, as shown in Fig. 8, the following means are provided.

A ring 50 surrounding the opening 18d in the member 18 is resiliently mounted on the portion 18a by means of a plurality of spring members 51 (see Figs. 3, 4 and 6) circumferentially disposed with respect to the opening 18d. One end of each spring 51 is fixedly attached to the ring 50 by any suitable attaching means, such as for example the rivet 53, while the other end of the said spring 51 is fixedly attached to the member

18a by any suitable attaching means, such as for example the screw 54.

The said springs 51 are so arranged as to normally maintain the ring 50 spaced from, and out of contact with, the upper plate 22, as in Fig. 6. Each of the springs 51 is provided with a free end portion extending from the rivet 53, the said free end portion being provided with an angular cammed portion 55 which projects freely upwardly through an opening 56 in the portion 18a. A cam ring 60 is rotatably mounted on the portion 18 surrounding the opening 18b and is disposed on the opposite side of the springs 51 from that of the ring 50. The said ring 60 is provided with circumferentially spaced notched portions 61 forming cams 62 therebetween. The cams 62 are so disposed with respect to the spring portions 55 that upon rotational movement of the ring 60 the said cams 62 will engage the said spring portions 55 to resiliently press the ring 50 downwardly against the action of the springs 51 and into contact with the plate 22. The ring 50 will thus cause the plate 22 to move toward the plate 20 against the action of the springs 40 and 41 to clamp the film F in position.

To facilitate the rotational movement of the cam ring 60, a handle 65 is provided, which projects freely through a slot 70 in the portion 18a. The said slot 70 is of such size as to limit the rotational movement of the ring 60 to such an extent that when the handle 65 is disposed as shown in Figures 1 and 4, in its extreme left position, the plates 20 and 22 will be spread apart as in Fig. 7, and when the handle is rotated to the extreme right position as shown by the dotted lines 65' in Fig. 4, the plates 20 and 22 will effectively grip the film F therebetween, as in Fig. 8 and in the manner hereinbefore described.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart.

2. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates being parallelly disposed and having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart without disturbing the parallel relationship thereof, projecting pins on one of said plates

received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates.

3. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, said pins being disposed on opposite sides of said film apertures to additionally serve as a guide for and to prevent lateral displacement of said film negative.

4. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus.

5. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart, and means for causing said plates to move toward each other against the action of said spring to grip the film negative therebetween.

6. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, and means for causing said plates to move toward each other against the action of said spring to grip the film negative therebetween, said last named means comprising a support for said negative carrier, an annular member mounted on said support and having a face thereof disposed adjacent one of said plates, a cam rider associated with said annular member, and a cam rotatably mounted on said support, said cam co-operating with said cam rider whereby upon rotation of said cam said annular member will be caused to move in a direction towards said last named plate.

7. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for nor-

mally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a pair of springs carried by one of said plates, each of said springs having widely spaced portions thereof contacting the other of said plates to uniformly urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent disalignment of said plates, said pins being disposed on opposite sides of said film apertures to additionally serve as a guide for and to prevent lateral displacement of said film negative, and means for causing said plates to move toward each other against the action of said spring to grip the film negative therebetween.

8. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring.

9. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring, said projecting pins being adapted to co-operate with said support portion to additionally serve as a means for preventing displacement of said plates in one direction.

10. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative

disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring, said projecting pins being adapted to cooperate with said support portion to additionally serve as a means for preventing displacement of said plates in one direction, and means for preventing displacement of said plates in a direction at right angles to said first named direction.

11. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring, said projecting pins being adapted to cooperate with said support portion to additionally serve as a means for preventing displacement of said plates in one direction, and means for preventing displacement of said plates in a direction at right angles to said first named direction, said last named means comprising a locking projection on one of said plates adapted to be received in a recessed shoulder in said support portion.

12. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring, said projecting pins being adapted to cooperate with said support portion to additionally serve as a means for preventing displacement of said plates in one direc-

tion, and means for preventing displacement of said plates in a direction at right angles to said first named direction, said last named means comprising a locking projection on one of said plates adapted to be received in a recessed shoulder in said support portion, said locking pin projecting in a direction opposed to that of said first named projecting pins and on the other of said plates from that of said projecting pins.

13. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures and means for normally maintaining said plates spaced apart to permit the passage therebetween of a film negative, said last named means comprising a spring carried by one of said plates and having a portion thereof contacting the other of said plates to urge the said plates apart, projecting pins on one of said plates received in corresponding apertures in the other of said plates to prevent relative disalignment of said plates, and means for removably supporting said carrier on said apparatus, said last named means comprising a base, a standard on said base, an arm slidable on said standard, said arm being provided with a support portion having a slotted opening into which said carrier plates are slidably received, said support portion having means associated therewith for urging said plates together against the action of said spring, said projecting pins being adapted to cooperate with said support portion to additionally serve as a means for preventing displacement of said plates in one direction, and means for preventing displacement of said plates in a direction at right angles to said first named direction, said last named means comprising a locking projection on one of said plates adapted to be received in a recessed shoulder in said support portion, said locking pin projecting in a direction opposed to that of said first named projecting pins and on the other of said plates from that of said projecting pins, and a groove in said support portion leading to said recessed shoulder to facilitate the positioning of said plates in said slotted opening.

14. In a photographic enlarging apparatus of the character described, a negative carrier comprising an upper plate, a lower plate, said plates having aligned film apertures, pairs of pins on said lower plate and projecting upwardly therefrom, corresponding pairs of apertures in said upper plate freely receiving said pins therein to limit relative displacement of said plates, and means for normally maintaining said plates spaced apart to permit the free passage therebetween of a film negative, said last named means comprising a pair of springs fixedly attached intermediate their ends to said upper plate, the said ends of said springs being free and angularly bent in a direction toward said lower plate, slotted openings in said upper plate, said bent spring ends freely passing through said slotted openings to abut against said lower plate.

15. A photographic enlarging apparatus according to claim 14, in which means are provided to cause said plates to move toward each other against the action of said springs to frictionally grip the film negative therebetween.

STEN JOHANSON.