

May 10, 1949.

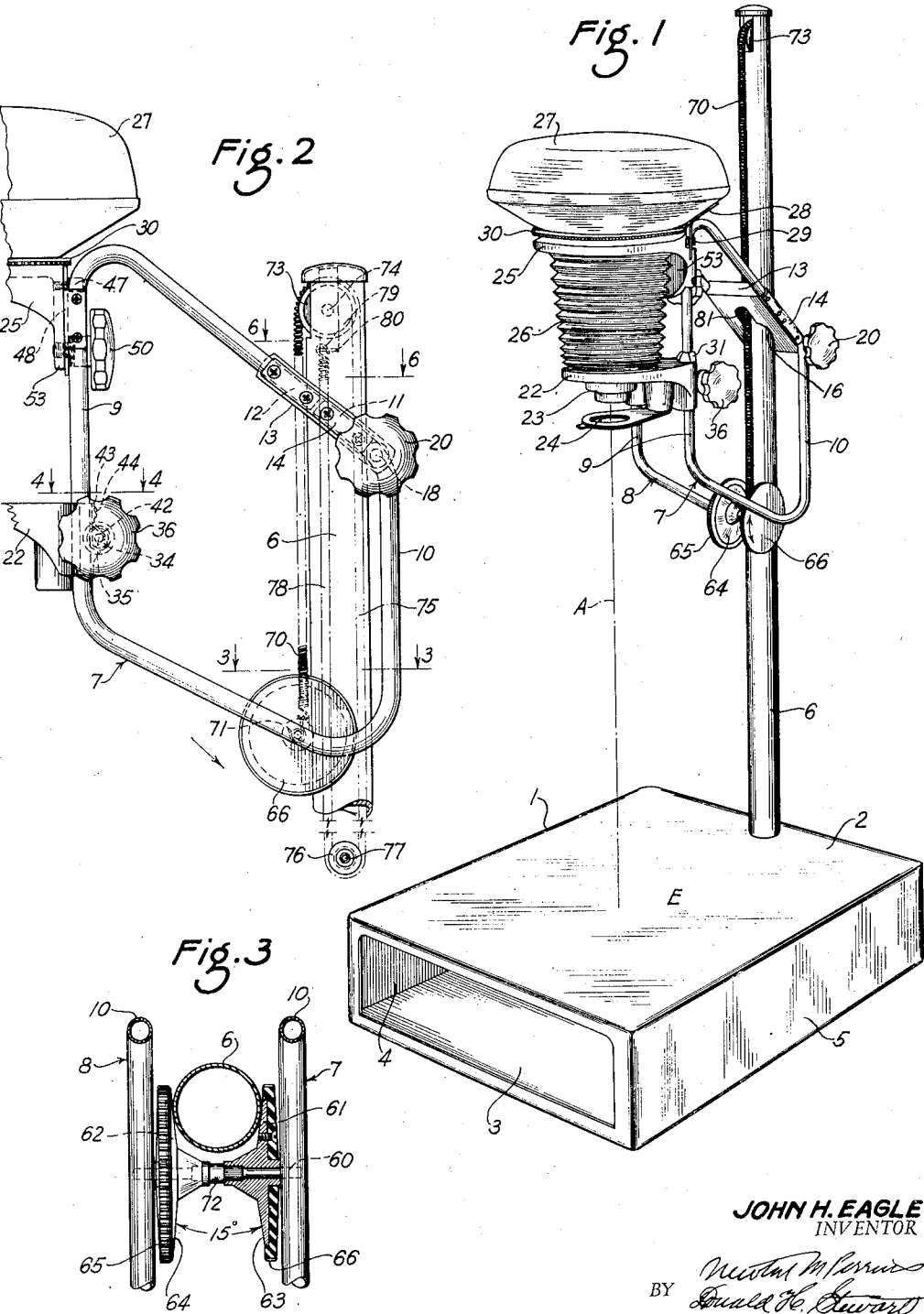
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2,469,685

FOCUSING APPARATUS FOR ENLARGERS

Filed March 26, 1948

2 Sheets-Sheet 1



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Fig. 4

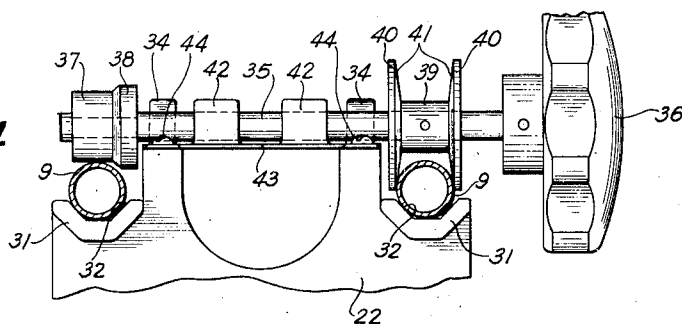


Fig. 5

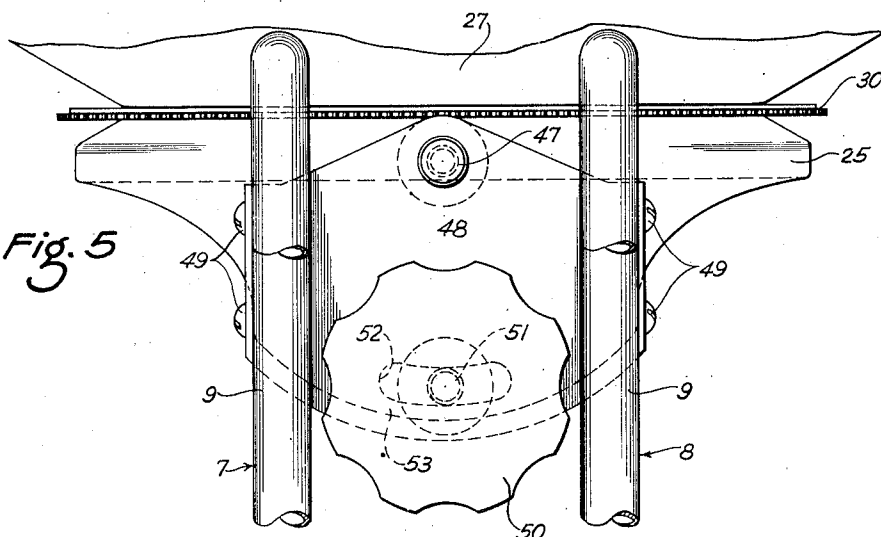
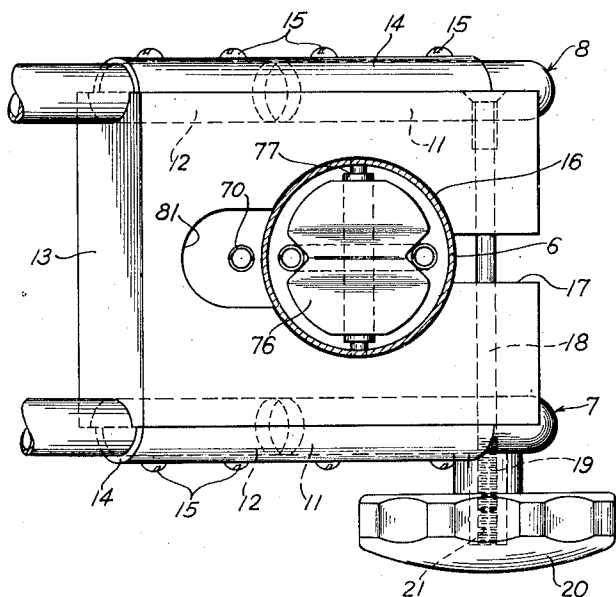


Fig. 6



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FOCUSING APPARATUS FOR ENLARGERS

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Application March 26, 1948, Serial No. 17,227

8 Claims. (Cl. 88—24)

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This invention relates to photography and more particularly to focusing apparatus for enlargers. One object of my invention is to provide a simple construction which is light in weight, accurate in use, and relatively inexpensive to build. Another object of my invention is to provide a device of the class described which does not require that the various parts be made with a high degree of accuracy to work satisfactorily. Another object of my invention is to provide a focusing device for enlargers supported by a single post so that it may be swung about the post; the parts being so designed that they will operate in any position to which the mechanism is swung. A further object of my invention is to provide a simple type of focusing mechanism which can be quickly moved to approximately the correct position, and to provide a device in which there is a fine adjustment for accurately finishing the focusing movement. Other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

Coming now to the drawings wherein like reference characters denote like parts throughout:

Fig. 1 is a perspective view of a typical enlarging machine equipped with a focusing apparatus constructed in accordance with a preferred form of my invention;

Fig. 2 is an enlarged fragmentary side elevation showing a portion of the focusing mechanism used in the enlarger shown in Fig. 1;

Fig. 3 is an enlarged fragmentary view partially in section showing a focusing wheel, or spool, engaging the supporting pallet;

Fig. 4 is a fragmentary top plan view of the focusing mechanism employed for moving the lens carriage;

Fig. 5 is an enlarged fragmentary rear elevation of the main support angular-adjusting mechanism; and

Fig. 6 is a top plan view, partially in section, of the slide block portion of the focusing mechanism.

In the embodiment shown in the drawings, an enlarger may include a base 1 which is preferably made of metal having a top wall 2 and a bottom wall 3 connected by side walls 4 and 5. This box-like structure may be employed as a paper holder and supports an upright post 6 which is preferably made of relatively light, tubular material anchored in the top and bottom walls 1 and 3 of the base member.

Slidably mounted on this tubular post 6 is a

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carriage which is preferably formed of a pair of similar spaced frames 7 and 8; the two frames being of like shape and being preferably made four-sided, as shown. Each frame has a pair of parallel sides 9 spaced from the post 6 and a pair of parallel sides 10 adjacent to the post. The frame members 7 and 8 are preferably made by forming a single rod, or, if extreme lightness is required, a single tube into the shape shown; the ends 11 and 12 of each frame member being fastened to a slide block 13, which is best shown in Fig. 6. This slide block may be made of suitable material, such as fiber; the rod ends being attached by curved plates 14 which may lie on the outside of the frame member ends and which may be attached to the slide block 13 by any suitable means, such as screws 15. The slide block 13 has a circular opening 16 to receive the post 6, this opening having a free-sliding fit with the post 6. The slide block is split as at 17 and a bolt 18 terminating in a threaded portion 19 is used for varying the tension on the post 6 by turning a knob 20 which has an interior thread 21 engaging the threaded end 19 of the bolt. Thus, the adjustment of the knob 20 controls the friction between the slide block 13 and the post and a comparatively slight turn of this knob will either lock the slide block in position or permit it to slide freely on the post in adjusting the apparatus for focusing.

The frame members 7 and 8 support on the parallel rails 9 a lens carriage 22. This lens carriage carries an objective 23 and may include a filter 24 which may be swung axially to and from the axis A of the enlarging apparatus. In addition, the parallel rails 9 near the top thereof support an upper bellows frame 25, a bellows 26 connecting the lens carriage 22 and the upper frame 25. A lamphouse 27 which may be of the construction shown in the copending application Ser. No. 17,225, filed March 26, 1948, may rest upon the frame 25; brackets 28, engaging studs 29 carried by the frame 25 to form a loose connection therewith, permitting a negative holder 30 to be inserted therebetween. For the specific construction of the negative holder reference may be had to copending application Ser. No. 17,226, filed March 26, 1948.

The lens carriage 22, as best shown in Fig. 4, is slidably mounted on the parallel rails 9. This lens carriage includes a pair of shoes 31 which are notched at 32 so as to have a two-point engagement with the parallel rails 9. The lens carriage 22 includes a pair of similar and rearwardly extending hooks 34, also shown in Fig. 2,

in which a shaft 35 may lie; this shaft having a knob 36 attached to one end for turning the shaft and having also, in the present instance, two different rail-engaging members. One rail-engaging member 37 may turn on the shaft or may turn with shaft 35 and may or may not be provided with a flange 38. The second rail-engaging member is a spool 39 having flanges 40 with inner walls 41 inclined toward the center of the spool. This mechanism including the cylindrical member 37 and the spool 39, as well as the shaft 35, are all spring-pressed tightly into contact with the parallel rails 9 by means of spring fingers 42 carried on the end of a plate 43 which may be attached to the lens carriage 22 as by screws 44.

Thus, the frictional engagement between the inclined walls 41 of the roller 39 causes the lens carriage 22 to be moved up and down when the focusing knob 36 is turned so that the lens carriage may be moved on the parallel rails 9 relative to the upper bellows frame 25 and the lamp-house 27.

The upper bellows frame 25 is attached to the upper end of the rails 9 in such a way that the frame 25 may be angularly tilted with respect to the axis A. Frame 25 carries a stud 47, as shown in Fig. 5; this stud passing into a plate 48 which is attached by screws 49 to the upper ends of the parallel rails 9. This attachment permits swiveling motion of the frame 25 when the knob 50 is released; this knob including a shaft 51 passing through an arcuate slot 52 in the plate 48 and being carried by the lower portion 53 of the upper bellows frame 25. Thus, if an angular position of the negative holder 30 is required for correction for distortion, the knob 50 is released and the upper frame 25 is swung to the desired angle within, of course, the limits of movement permitted by the slot 52.

The entire carriage consisting of the parallel frames 7 and 8 may be moved up and down the column by releasing or adjusting the handwheel 20 to create the proper friction upon the post 6. This movement can be accomplished by sliding the parallel frames along with one hand while adjusting the knob 20 with the other. However, such adjustment, while convenient, is not as convenient for fine focusing or for giving the final adjustment to the enlarger as the use of the fine adjusting mechanism which will now be described.

At the bottom of the parallel rails 10, and on the side facing the post 6, there is an adjusting mechanism, best shown in Fig. 3. This mechanism comprises a shaft 60 carrying a pair of flanges 61 and 62; these flanges having inclined inner walls 63 and 64. While the inclination of these walls relative to each other may be varied, I have found that best results can be obtained where the included angle between the walls is in the neighborhood of 15° because this produces a desirable friction between the spool-shaped focusing wheel and the post 6. In order to facilitate turning the spool-shaped member, I have provided flanges 65 and 66 which are preferably knurled or roughened on their outer edges so that these two wheels are convenient to an operator, one on either side of the machine. After the quick focusing has been accomplished by moving the slide block 13 up or down the post, and adjusting the lens carriage 22, the final fine adjusting may be done by using either or both of the flanges 65 and 66, turning these flanges manually back and forth until the maximum sharpness of the image ap-

pears on the paper easel E which is the top surface of the box-like member 1 or which may be a surface on any standard type of paper holder which may be used.

The location of the spool-like focusing member just described is important. By placing this spool member on the same side of the post as the enlarging camera, the weight of the enlarging camera and the frame members 7 and 8 tends to try to rotate the focusing camera about the slide block 13 in the direction shown by the arrow in Fig. 2. This movement, of course, holds the tapering inner walls 63 and 64 of the focusing wheel firmly in frictional contact with the post 6, so that there is no relative slippage between these walls and the post as the parallel frames are moved up and down.

In order to facilitate the movement of the focusing camera, it is counter-balanced by a long coiled spring 70 which, as best shown in Fig. 2, is connected to a hook 71 engaging a medial portion 72 of the shaft 60 and thence passing upwardly along a wall of the post 6. A pulley 73 is mounted on a shaft 74 in the top of the post 6, the spring passing over this pulley, thence down through the post, as indicated at 75, about a lower pulley 76 pivotally mounted at 77 in a suitable manner inside of the post, and thence upwardly again in a run 78 which terminates at 79 where the spring is hooked over a support 80. Thus, when the parallel frame members are moved downwardly, the coiled spring counter-balances, or at least partially counter-balances the weight of the enlarging camera and therefore makes it a simple matter to move the enlarging camera up, the long coiled spring assisting in this movement.

In operation, it is a simple matter to adjust the knob 20 until the fiber slide block 13 engages the post 6 with such light friction that the machine may be readily moved up and down. When the proper position is reached, a partial turn of the knob 20 can be made to frictionally engage the post very lightly so that the carriage may still slide upon the post but will normally remain in a set position because of the counter-balancing spring 70. When this friction is adjusted to the right extent, which can be very easily done in practice, a hand-wheel 65 or 66 may be used to adjust the frames for fine adjustment since the friction between the spool-like focusing member and the post 6 is sufficient to overcome the light friction of the slide block. When the final position is reached, an additional turn of the knob 20 will firmly secure the enlarging camera in place.

It is sometimes desirable to swing the focusing apparatus so that the focus can be obtained on some other support than the usual easel E, such as, for instance, the floor when the enlarging machine is set on a table. With my apparatus the entire enlarging apparatus may be swung about the post at any time by merely releasing the knob 20 and the friction on the slide block 13 so that it turns radially about the post 6. The spring 70 will readily swing around with the rest of the apparatus and the notch 81 in the sliding block, as shown in Fig. 6, will guide the spring 60 during this swinging movement to prevent any binding between the spring, slide block, and post.

With the focusing construction above described, a rigid and yet strong apparatus requiring but few relatively accurate tolerances can be constructed as the frame members 7 and 8 may be of light rod or if desired may be of strong, light, tubular construction, as shown. It will be

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noticed that the lens carriage may fit rather loosely on the parallel rails 9 and since only one driving spool 39 is employed, the location of the second cylindrical member 37 does not require any degree of accuracy. In fact, the flange 38 may be omitted, if desired. It should also be noticed that the shaft 35 is loosely held by the hooks 40 and held in position by the spring fingers 42. The position of the shaft is such that the wheel 37 and spool 39 are spring-pressed into engagement with the parallel rails 9, thus holding the shoes 31 in engagement with the rails on the opposite side. This construction is desirable since it is not only inexpensive but it provides the required firm contact between the inclined surfaces of the spool-focusing member and the rail.

In spite of the relatively inexpensive construction, the above described focusing mechanism is light in weight, operates smoothly, and provides a mechanism which can be adjusted quickly to an accurate focus by the use of the handwheel 20 alone or preferably in conjunction with one of the focusing wheels 65 or 66.

I claim:

1. Enlarger focusing apparatus comprising a pair of spaced frames including parallel portions forming tracks, a bellows support carried at the tops of the tracks, a lens board slidable upon the tracks, a pair of parallel frame portions spaced from the tracks, a slide block at one end of said parallel portions, a post projecting vertically through the slide block, means for varying the frictional engagement between the slide block and vertical post, a flanged, spool-shaped member rotatably carried on the ends of the parallel frame portions spaced from the slide block and on the same side as the tracks whereby the weight of the tracks, lens board, and bellows support tends to thrust the spool-shaped member frictionally against the vertical post, the inner walls of the spool flanges being disposed at an angle to frictionally engage spaced walls of the vertical post to slide the spaced frames and slide block thereon by manually turning the spool when the frictional contact between the slide block and vertical post is sufficiently reduced.

2. Enlarger focusing apparatus as defined in claim 1 characterized by the outer peripheries of the spool flanges being of a larger diameter than the angular disposed inner walls of the spool flanges to project from the post into an accessible position for manually adjusting the spaced frame members relative to the post.

3. Enlarger focusing apparatus as defined in claim 1 characterized by the vertical post being round in cross section, and the angular inner walls of the spool flanges frictionally engaging spaced portions of the round post, and outer extensions on the spool flanges having a roughened periphery and projecting from the post for manually turning the spool-shaped member to adjust the parallel frames relative to the post.

4. Enlarger focusing apparatus as defined in claim 1 characterized by the vertical post being round in cross section, and the angular inner walls of the spool flanges frictionally engaging spaced portions of the round post having an included angle between them in the order of 15° whereby said angular inner walls under the influence of the weight of the enlarger and track are wedged against the round section of the vertical post.

5. Enlarger focusing apparatus comprising a pair of spaced four-sided frames having two sides

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parallel, each frame consisting of a bent rod, a slide block, the ends of each rod being attached to the slide block, a vertical post passing through the slide block, means for varying the friction between the slide block and post, a spool rotatably carried between the spaced frames and frictionally engaging the post, two of the parallel frame sides constituting a pair of tracks, a lens carriage slidable on the rails on shoes engaging the rails, an objective carried thereby, a slide block moving means including a handle, a flanged spool engaging at least one rail, a shaft carrying the flanged spool, a spring holding the spool on the rail and the shoe on the track, and means at the top of the rails for holding a support and lamphouse against the top of the rails, means for moving said post and rail-engaging spools for focusing the enlarger, and moving the objective relative to the support and lamphouse, and both the lamphouse and support relative to the post.

6. Enlarger focusing apparatus comprising a pair of spaced four-sided frames having two sides parallel, each frame consisting of a bent rod, a slide block, the ends of each rod being attached to the slide block, a vertical post passing through the slide block, means for varying the friction between the slide block and post, two sides of the frames being parallel and offset from each other, by the tops and bottoms of the frames, one pair of parallel frame members constituting tracks spaced from the slide block for supporting a slide block, bellows, negative support and lamphouse, the weight of which parts is offset from the slide block tending to turn the frames thereabout, a spool rotatably carried between the frames positioned to bear against the post and preventing turning movement about the slide block through frictional engagement with the post, said spool being manually rotatable to move the frames and slide block relative to the post when friction between the post and slide block are suitably adjusted, a counterbalancing coil spring connected to the frames through the spool and extending past the slide block to the top of the post, pulleys at the top of the post and down inside of the post over which the spring passes, said spring end being anchored near the top of the post after passing up in the post from the lower pulley therein.

7. Enlarger focusing apparatus comprising a pair of spaced four-sided frames having two sides parallel, each frame consisting of a bent rod, a slide block, the ends of each rod being attached to the slide block, a vertical post passing through the slide block, means for varying the friction between the slide block and post, a spool rotatably carried between the spaced frames and frictionally engaging the post, two of the parallel frame sides constituting a pair of tracks, a lens carriage slidable on the rails, shoes slidably engaging the rails, means for holding the shoes on the rails comprising a shaft, spring means pressing the shaft toward the shoes, two rollers carried by the shaft opposite the shoes, one roller including a cylindrical portion engaging one rail, the other roller including spaced inclined flanges engaging opposite portions of the other rail and a handle for turning the shaft and inclined flanged roller to slide the shoes over the rails for adjusting the lens carriage thereon.

8. Enlarger focusing apparatus comprising a pair of spaced four-sided frames having two sides parallel, each frame consisting of a bent rod, a slide block, the ends of each rod being attached to the slide block, a vertical post passing through

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the slide block, means for varying the friction between the slide block and post, a spool rotatably carried between the spaced frames and frictionally engaging the post, two of the parallel frame sides constituting a pair of tracks, a lens carriage 5 slidable on the rails, shoes slidably engaging the rails, means for holding the shoes on the rails comprising a shaft, hooks carried by the lens carriage for loosely supporting the shaft, spring 10 means pressing the shaft toward the shoes and for holding the shaft in the hooks carried by the

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lens carriage, two rollers carried by the shaft opposite the shoes, one roller including a cylindrical portion engaging one rail, the other roller including spaced inclined flanges engaging opposite portions of the other rail and a handle for turning the shaft and inclined flanged roller to slide the shoes over the rails for adjusting the lens carriage thereon.

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No references cited.