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MEANS FOR TONING PHOTOGRAPHIC PRINTS

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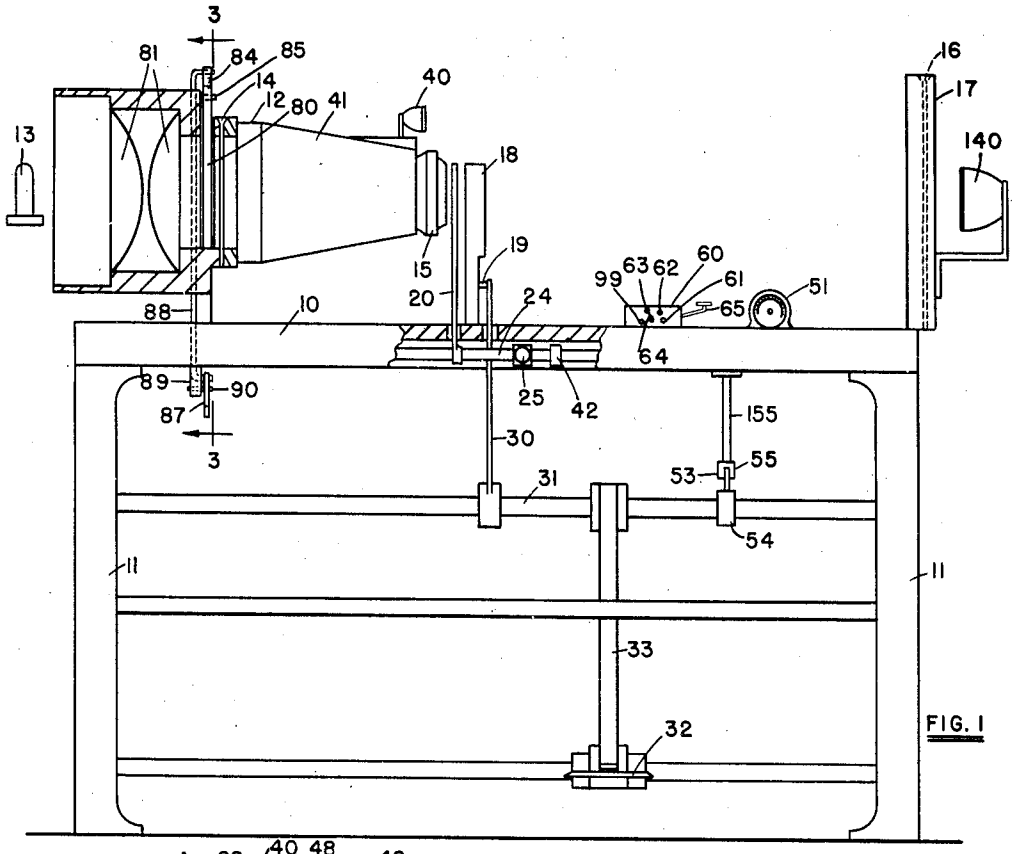


FIG. 1

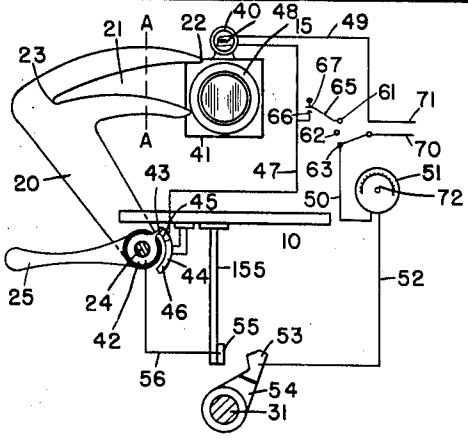


FIG. 2

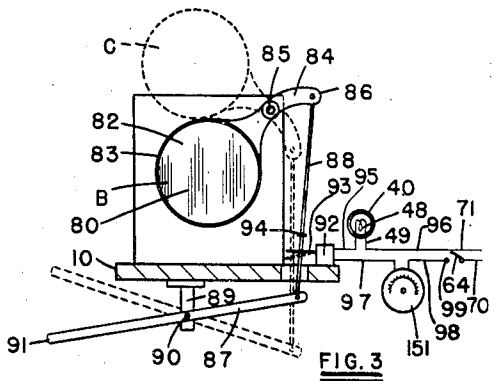


FIG. 3

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MEANS FOR TONING PHOTOGRAPHIC PRINTS

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9 Claims. (Cl. 88—24)

This invention relates to photographic equipment, and more particularly to a means for softening the tone of photographic prints made from dense, hard or contrasty negatives.

An object of the present invention is to provide means for flashing an auxiliary controlled beam of light onto printing paper undergoing exposure, for the purpose of softening the tone of the resultant print.

Another object of the invention is to provide means for coordinating the operating periods of the beam of flashed light relative to the density of the particular negative being printed.

A further object of the present invention is the provision of a photographic printer including novel means for toning down sharp or contrasty prints to secure a mellow characteristic, this being accomplished without regard to the type or grade of photographic printing paper used in the printer, thereby enabling the printer to be operated continuously using a single type of paper in the printing of all types of negatives.

Still a further object of the present invention is to provide selective control means for flashing an auxiliary controlled beam of light onto a sheet of printing paper prior to, during, or after the normal exposure of the printing paper to a projected, image bearing beam.

Still a further object of the invention is to provide a device of the character stated which is both structurally and mechanically simple, inexpensive and durable.

These and other objects are attained by the means described herein and disclosed in the accompanying drawing, in which:

Fig. 1 is a side view of a printing enlarging machine embodying alternate forms of the present invention, with parts thereof cut away for clarity of detail.

Fig. 2 is a diagrammatic view of the electrical circuit of one of the light flashing devices, embodying the present invention, of Fig. 1.

Fig. 3 is a vertical section on line 3—3 of Fig. 1 including the electrical circuit of the second flash device embodying the present invention.

The present invention is directed to the provision of means for softening the tone of photographic prints made from dense or contrasty negatives. By softening the tone of photographic prints it is possible for an operator to obtain soft, pleasing prints from dense or hard negatives when using the same type or grade of photographic paper as is used for printing other, less dense negatives.

A typical printing enlarging machine to which the present invention may be applied is illustrated in Fig. 1, wherein the numeral 10 indicates the bed of the machine, which may be supported upon leg standards 11. A projector 12, including a source of illumination, such as electric lamp 13 is shown mounted on the left end of the bed for projecting the image of a negative mounted laterally within gate 14, through projection lens 15 onto a sheet of sensitized photographic printing paper disposed in gate 16 of a paper support 17 suitably mounted to bed 10.

A shutter for lens 15, denoted generally by the numeral 18, may be provided for controlling the time period during which the printing paper is exposed to the image bearing projection beam during the printing operation. Said shutter may include a trip lever 19 which may be actuated, for operating the shutter, by means of a connector 30, the lower end of which is operatively secured to rock shaft 31, which in turn is operatively connected to foot treadle 32 by link 33, as illustrated.

Inasmuch as the individual densities of the negatives, the images of which are projected onto paper mounted in gate 16, differ haphazardly from very light to very dense, suitable means may be provided for standardizing the density of the image bearing beam projected from the negatives regardless of their individual density. One form of such projected light control means may comprise, by way of example, a diaphragm plate 20 swingedly mounted between projection lens 15 and shutter 18.

As disclosed in Fig. 2 diaphragm plate 20 may comprise an apertured portion 21, the width of which progressively decreases from a maximum at the outer end 22, to a minimum at the inner end 23. The lower end of said plate may be secured to and carried by an auxiliary shaft 24, which may be suitably mounted to bed 10 for rotation about its longitudinal axis. This shaft may be actuated by means of a handle 25, or the like, for shifting diaphragm plate 20 relative to and across the optical axis of projection lens 15 for selectively controlling the effective aperture size of the lens.

The amount by which the projection beam from lens 15 is modified for a particular negative undergoing projection, depends upon, and is a function of the density of the particular negative being projected. The effective aperture size of the projection lens may, for each negative, be determined either by the judgment of the operator, or by mechanical means responsive to the

intensities of the light from lamp 13 as modified by the particular negative placed in gate 14. It may be generally stated that the effective aperture size of the projection lens is varied inversely to the intensity of the beam entering the projection lens, wherefore it becomes apparent that for a dense negative the effective aperture size of the projection lens will be modified a very small amount, if at all. Conversely, for negatives of a lesser density, that is, thin or light negatives, the amount by which the intensity of the light entering the lens is reduced for projection, is much greater. With reference to Fig. 2, the reference line A—A indicates, by way of example, that portion of diaphragm aperture 21 which will be aligned with the optical axis of projection lens 15 for a negative having an average density. Therefore, when a dense negative is being projected the diaphragm plate will be shifted relative to lens 15 so as to dispose those portions of aperture 21 between ends 22 and line A—A before the lens for obtaining a relatively large effective aperture size of said lens. By the same token, negatives having a lesser density than the so-called ideal or average negative will necessitate aperture 21 being aligned with lens so as to dispose its narrower portions, between line A—A and end 23, before the lens.

The means employed for softening the tone of photographic prints made from dense or hard negatives may comprise an auxiliary illuminator 40, which may be in the form of a small spotlight aimed at the print, or if preferred, provision may be made for utilizing part of the projection beam for that purpose. The arrangement for use of the auxiliary, or tone-softening illuminator, is such that its light rays are controlled by means of a timing device which, in turn, is rendered operative and inoperative to close an electric circuit to the auxiliary illuminator in accordance with movements of the diaphragm plate 20 relative to the optical axis of lens 15.

This control arrangement is clearly illustrated in Figs. 1 and 2 wherein an auxiliary illuminator 40 is shown mounted upon the projector barrel or housing 41. As previously explained, rock shaft 24 may be actuated by handle 25 for aligning the proper portion of diaphragm plate aperture 21 with the optical axis of lens 15, depending upon the nature of the negative to be printed, for standardizing the intensity of the image bearing projected beam. As hereinabove stated, the image bearing projection beam emanating from lens 15 will be relatively unrestricted when dense or hard negatives are being projected. This means that only those portions of the diaphragm aperture 21 to the right of reference line A—A will be placed in register with lens 15.

It will, therefore, be understood that when dense or contrasty negatives are being projected, the projected images thereof will withstand a limited amount of controlled illumination by the rays from the auxiliary illuminator 40. Such auxiliary rays have a softening or mild fogging effect upon the paper being printed, as well understood by those versed in the art. It is important, however, that the duration of time during which these toning rays are projected onto the printing paper, be accurately controlled. Experience has demonstrated that such auxiliary rays should not be used in the printing of light negatives, that is, when printing negatives wherein that portion of aperture 21 of diaphragm plate 20 to the left of reference mark A—A is in register with the projection lens. Accordingly, means are provided for automatically rendering the auxiliary illuminator inoperative upon movement of the diaphragm plate 20 beyond, by way of example, that portion of aperture 21 located to the left of reference point A—A.

Such means may consist of a selector switch 42 which includes a movable contactor arm 43, which is operatively secured to and carried by shaft 24, and a fixed or stationary contact 44 mounted to bed 10 as clearly disclosed in Fig. 2. Contact 44 comprises a conductor segment 45 and an insulator segment 46. During those periods of time when diaphragm plate 20 is disposed with that portion of aperture 21 to the right of reference point A—A aligned with the optical axis of lens 15, contactor arm 43 will be in closed circuit relationship with the conductor segment 45 of contact 44. As shaft 24 is rocked in a clockwise direction for aligning various portions of aperture 21 between ends 22 and reference line A—A relative to the projection lens, the movable contactor arm 43 will continue to engage the conductor segment 45 of the contact block. Further clockwise rotation of shaft 24 will cause contactor arm 43 to engage the insulator segment 46 of contact 44 as those portions of aperture 21 disposed to the left of line A—A are aligned with the lens.

The conductor segment 45 of contact 44 may be connected by conductor 47 with one side of bulb 48 of the auxiliary illuminator 40. Conductor 49 connects the other side of bulb 48 to line 71 of any suitable source of electricity. A conductor 50 connects the other line 70 of the source of electricity to one side of a suitable timer device denoted generally by the numeral 51, the other side of which timer is connected by a conductor 52 to a movable contact element 53 carried by swinging contact arm 54, carried by and secured to rock shaft 31. Contact 53 is adapted to engage a fixed contact 55, mounted to bed 10 by bracket 155, when shaft 31 has been actuated, via foot treadle 32, to operate shutter 19. Conductor 56 connects contact 55 with contactor arm 43.

The timer device 51 may be of any approved or accepted type capable of maintaining a closed electrical circuit for a definite, predictable period of time. Such timer is preferably provided with suitable means for permitting various timing cycles to be set on said device.

From the foregoing, it will be evident that when foot treadle 32 is depressed, rock shaft 31 will be rotated about its longitudinal axis for causing contact element 53 to engage contact 55. If contactor arm 43 is in engagement with the conductor segment 45 of contact block 44, an electrical circuit to lamp 48 will be closed and simultaneously therewith a timing cycle will be initiated in timer 51, with the result that the auxiliary illuminator 40 will be energized for casting its light rays upon the photographic paper undergoing printing. Upon the expiration of such a timing cycle, or upon release of foot treadle 32, whichever occurs first, the electrical circuit to lamp 48 will be broken and the flashing or toning period will be terminated. It will be noted that energization of the auxiliary illuminator 40 is possible only for those positions of diaphragm plate 20 between reference mark A—A and the outer ends 22, that is, when the maximum amount of projected light is permitted to be projected from lens 15 onto the printing paper. In other words, when the diaphragm plate 20 is moved

for registering that portion of aperture 21 to the left of reference point A—A relative to the optical axis of lens 15 the electrical circuit of the auxiliary illuminator 40 will be broken at selector switch 42.

With reference to Fig. 3 and to the left end of projector 12 of Fig. 1 a second, or alternate type of means for coordinating the operating periods of auxiliary illuminator 41 relative to the density of the negative being projected is illustrated. Such means may comprise a movable diffuser plate 80 disposed between condenser unit 81 and film gate 14 as shown. The essential characteristic of diffuser plate 80 is to uniformly reduce the intensity of the light beam leaving the condensers 81 prior to passage through a negative mounted in gate 14 during those periods of time when the image of a thin or light negative is being projected onto paper mounted in support 17. If desired, diffuser plate 80 may comprise a ground glass disk 82, Fig. 3, which may be suitably mounted within a circumscribing rim 83.

As clearly disclosed in Fig. 3, a diffuser plate 80 is adapted to be disposed in either of two normal positions, viz, in a lowered beam intercepting position B, or in a raised non-intercepting position C. If desired, rim 83 may include an arm 84 pivotally mounted to the projector housing as at 85. The outer end 86, of arm 84 may be operatively connected to an actuator lever 87 by a connecting rod 88. Actuator lever 87 may be pivotally secured, as at 90, to support bracket 89 which may be secured to, and carried by bed 10. This construction enables an operator to swing diffuser plate 80 upwardly from position B to position C by lifting upwardly on actuator lever 87 at 91, as indicated by the broken lines.

It should be understood that diffuser 80 will be disposed in its lowered beam intercepting position B during those periods of time when a light or thin negative is mounted in gate 14, the image of which is projected onto the printing paper. It should likewise be understood that diffuser 80 will be disposed in its raised non-intercepting position C during the projection of dense, or contrasty negatives, the projection of which requires a maximum beam intensity. As hereinabove pointed out, it is highly desirable to soften the tone of photographic prints made from dense, hard or contrasty negatives, therefore, means are provided for completing an electrical circuit to the auxiliary illuminator 40 whenever diffuser plate 80 is raised upwardly to its beam non-intercepting position C. With reference to Fig. 3 such means may comprise an electric switch denoted generally by the numeral 92, including a projecting switch-actuator-arm 93, which is adapted to be lowered for completing an electric circuit to illuminator bulb 48 when contacted by stop member 94 carried by rod 88. It should be understood that conductor 95 may be provided for establishing an electrical connection between the one side of switch 92 and one side of illuminator bulb 48, and that a second conductor 96 may be provided for connecting the other side of said bulb to one side of an electric supply line 71. The other side of switch 92 may be connected by means of conductor 97 to one side of a timer device, denoted generally by the numeral 51, the other side of which timer may be connected by conductor 98 to contact point 99, which is adapted to be connected to the other side of electric line 70 when movable switch arm 64 has been closed.

From the foregoing it is apparent that the auxiliary illuminator 40 will be energized only during those periods of time when diffuser plate 80 has been lifted to position C incident to the projection of the image of a dense, hard or contrasty negative.

In order to obtain maximum flexibility of the auxiliary illuminator 40, means are preferably provided for rendering the operating characteristics of said illuminator either automatically operable, manually operable or non-operable. Such means may comprise a four-way switch 60, including four spaced contact points such as 61, 62, 63 and 99, and a movable selector arm 64. Conductor 50, Fig. 2, may terminate in contact point 63, whereas one end of movable selector arm 64 may be continually connected with lead 70 of the pair of leads 70 and 71 of the electrical supply line. During those periods of time when movable selector arm 64 is swung so as to engage contact 63 the automatic operation of the illuminator hereinabove described relative to Fig. 2 may take place.

In order to permit manual control of auxiliary illuminator 40 means are provided for electrically disconnecting that portion of the electrical circuit from the timer 51 to conductor 47, and for placing key 65 in the circuit. Key 65 may include a stationary contact point 66 electrically connected to conductor 47, and a movable contact point 67 which is electrically connected to contact point 61. When selector arm 64 is moved to engage contact point 61 the auxiliary illuminator may be energized whenever key 65 is manipulated by an operator regardless of the setting of diaphragm plate 20. In order to render the auxiliary illuminator 40 non-operative the movable selector arm 64 may be swung to engage contact point 62, which comprises a neutral point. In order to render the auxiliary illuminator control means of Fig. 3 operative selector arm 64 may be swung to engage contact point 99.

It should be understood that the auxiliary illuminator 40 may be supported upon the machine at any convenient location from which its light rays may be projected onto the sensitized photographic paper to be exposed to the image of a negative supported within film gate 14, Fig. 1. Experimentation has demonstrated that satisfactory results may be obtained when the toning rays of the auxiliary illuminator are directed onto the rear, as well as the front of the sensitized printing paper, therefore, if desired an auxiliary illuminator may be suitably mounted as at 140 to the rear of paper support 17, as illustrated. It should be understood that when the auxiliary illuminator is positioned as at 140, so that its toning rays fall upon the rear, non-sensitive side of the printing paper, the rear portion of paper support 17 must necessarily be open. In some instances it may be desirable to utilize both auxiliary illuminators 40 and 140 whereby to permit a simultaneous flashing of the front and rear surfaces of the photographic printing paper mounted in gate 16.

By providing such auxiliary illuminators, it will be found possible to eliminate the necessity for utilizing several grades or types of sensitized printing paper in the production of photographs. The use of different grades or types of printing paper was heretofore necessary due to the fact that the projected images from a single roll of film would vary inversely with the densities or contrast characteristics of the individual negatives comprising said film. The operator of the printer was heretofore required to select the

proper type or grade of printing paper for each negative being projected depending upon its individual density. The necessity for such a selection of printing paper is eliminated by the present device, first, by means of diffuser plate 80, or the diaphragm plate 20 which permits the intensity of the projected image bearing beam from the various negatives to be standardized, regardless of the particular density of the individual negative being projected, and secondly, by means of the auxiliary illuminator which softens the tone of those photographic prints made from dense or contrasty negatives. By means of the auxiliary illuminator of the present invention it is possible to tone down and soften the prints made from dense negatives, except when the dense negative to be printed is a so-called stain negative. When a stain negative is to be printed it is preferable, though not essential, for an operator to substitute a special hard grade photographic printing paper for the standard grade being used for printing all other types of negatives.

The duration of the toning light or flash may be readily varied to meet the particular conditions arising from time to time, by suitably adjusting pointer 72 of timer 51 for controlling the duration of the timing cycle.

It should be understood that while the printer of Fig. 1 is provided with both types of control means of Figs. 2 and 3, in actual practice but one or the other would be used. In those instances when it is desired to flash the printing paper prior to, or after exposure, key 65 may be used to advantage.

It is to be understood that various modifications and changes in the structural details of the present device may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. In a photographic device, a film support, a paper support, a projection lens and a source of light for projecting the image of a negative mounted in said film support onto paper mounted on said paper support, a shutter for said lens, an auxiliary illuminator for projecting an auxiliary beam of light onto said paper, a timer for controlling the operating characteristics of said illuminator, and means operable for simultaneously operating said shutter and initiating a timing cycle in said timer whereby the beam from said auxiliary illuminator will be projected onto the printing paper coincident with the image bearing beam.

2. In a photographic device, a film support, a paper support, a projection lens, a source of light for projecting the image of a negative mounted in the film support onto a sensitized printing paper mounted on the paper support, a shutter for said lens, a diaphragm for said lens for controlling the effective aperture size of said lens with regard to the density of the particular negative being projected, an auxiliary illuminator for projecting a beam of light onto said paper, a timer for controlling the operating period of said illuminator, means for synchronizing the opening of said shutter with the initiation of a time cycle in said timer, and means for rendering said illuminator operable and inoperable dependent upon the effective aperture size of said lens for the particular negative being printed.

3. In a photographic device of the character described, the combination of a film support, a paper support, projection means including a light beam to project the image of a film held by the film support, onto a photographic paper supported by said paper support, and a controlled source of light projectable onto the photographic paper additional to the beam light projecting the image, for softening the tone of the resultant print, the control for said tone softening light comprising an apertured diaphragm movable across the optical axis of the lens for controlling the intensity of the projected beam and means coordinated with the movements of said diaphragm for rendering the tone-softening light source inoperative upon the photographic paper when the diaphragm is in posiiton to intercept a substantial part of the projection beam.

4. In a photographic device of the character described, the combination of a film support, a paper support, projection means including a light beam to project the image of a film located in said film support, onto photographic paper supported by said paper support, a diffuser plate for controlling the quantity of light passing through said film in accordance to its density, said diffuser plate having but two normal positions, one in a lowered beam modifying position, the other in a raised beam non-intercepting position, an auxiliary illuminator for projecting an auxiliary beam of light onto said paper in addition to the image bearing projected beam, and means for rendering said illuminator operable and inoperable dependent upon the position of said diffuser plate during the projection of the particular negative being printed.

5. In a photographic device, a film support, a paper support, a projection lens and a source of light for projecting the image of a negative mounted in said film support onto paper mounted on said paper support, a shutter for said lens, an auxiliary illuminator for projecting an auxiliary beam of light onto said paper, means for correlating the operating characteristics of said illuminator relative to the intensity of the image bearing beam, and means for synchronizing said last mentioned means with said shutter whereby an auxiliary beam from said illuminator will be projected onto said paper coincident with and for a length of time not exceeding the exposure period of said paper to the image bearing beam.

6. In a photographic device, a film support, a paper support, a projection lens and a source of light for projecting the image of a negative mounted in said film support onto paper mounted on said paper support, a shutter for said lens, an auxiliary illuminator mounted in front of said paper support for projecting an auxiliary beam of light onto the sensitized surface of said paper, a timer for controlling the operating characteristics of said illuminator, and means operable for simultaneously operating said shutter and initiating a timing cycle in said timer whereby the beam from said auxiliary illuminator will be projected onto the printing paper coincident with the image bearing beam.

7. In a photographic device, a film support, a paper support, a projection lens and a source of light for projecting the image of a negative mounted in said film support onto paper mounted on said paper support, a shutter for said lens, an auxiliary illuminator mounted to the rear of said paper support for projecting an auxiliary beam of light onto the rear unsensitized surface of said paper, a timer for controlling the operating characteristics of said illuminator, and means operable for simultaneously operating said shutter and initiating a timing cycle in said timer

whereby the beam from said auxiliary illuminator will be projected onto the printing paper coincident with the image bearing beam.

8. In a photographic device, a film support, a paper support, a projection lens and a source of light for projecting the image of a negative mounted in said film support onto paper mounted on said paper support, a shutter for said lens, a pair of auxiliary illuminators mounted one in front of and one to the rear of said paper support for simultaneously projecting an auxiliary beam of light onto the front and rear surfaces of said paper, a timer for controlling the operating characteristics of said illuminators, and means operable for simultaneously operating said shutter and initiating a timing cycle in said timer whereby the beam from said auxiliary illuminators will be projected onto the printing paper coincident with the image bearing beam.

9. In a photographic device of the character described, the combination of a film support, a paper support, projection means including a light beam to project the image of a film held by the film support, onto a photographic paper supported by said paper support, and a controlled source of light projectable onto the photographic paper additional to the light beam projecting the image, for softening the tone of the resultant print, the control for said tone softening light comprising an apertured diaphragm movable across the optical axis of the lens for controlling the intensity of the projected beam and means coordinated with the movements of said diaphragm for rendering the tone-softening light source inoperative upon the photographic paper when the diaphragm is in position to intercept more than a predetermined portion of the projected beam.

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