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DRAWINGS ATTACHED

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(54) APPARATUS FOR CLOSE-UP PHOTOGRAPHY

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America, of 343, State Street, Rochester, New York 14650, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus adapted for use in taking close-up photographs, and particularly to such apparatus for use with a photoflash camera, that is, a camera supporting or adapted to support a photoflash unit in predetermined relative position such that flash light can be directed at a subject in front of the camera lens.

It is known to provide a fixture for holding a camera and/or the subject to be photographed so as to maintain the two in a relationship suitable for taking close-up photographs. It is also known to provide such a device with an auxiliary lens to assist in focusing the camera on the subject. In such known apparatus, however, means separate from the camera itself are relied upon to provide adequate illumination. Same holding devices have no means incorporated therein for augmenting ambient light and can therefore be used only where ambient illumination (either natural or artificial) is adequate. Others provide artificial illumination of the subject by means of lamps and reflectors connected to the structure of the device, and tend to be complex, costly, and unwieldy.

According to the present invention there is provided photographic apparatus, for use in making close-up photographic flash exposures with a photoflash camera, which comprises a frame having a first portion delimiting a camera-subject area and a second portion providing a camera-mounting surface, means for detachably securing a photoflash camera to the camera-mounting surface so

that the camera lens faces the camera-subject area, a reflector fixed to said frame between the camera-mounting surface and the camera-subject area and having a diffuse surface thereon to attenuate and reflect on to the flash light from the photoflash camera when secured to the camera-mounting surface, and a baffle fixed to the frame to prevent camera flash light from striking the camera-subject area directly and from being reflected by the reflector directly into the camera lens.

Two embodiments of devices for use with photoflash cameras to enable close-up photographs to be taken will now be described by way of example with reference to the accompanying drawings in which:—

Fig. 1 is a perspective view of the first embodiment adapted specifically for use with a camera utilizing a multi-lamp flash unit of the flashcube type;

Fig. 2 is a different perspective view of the embodiment of Fig. 1 showing a flashcube camera mounted therein ready for use;

Fig. 3 is a schematic view of the first embodiment showing its principal elements in relation to each other and to the camera mounted therein;

Fig. 4 is a perspective view of the second embodiment which is generally similar to that of Figs. 1, 2, and 3 but is larger and collapsible;

Fig. 4a is a fragmentary perspective view of a portion of the embodiment of Fig. 4 showing a removable handle attached thereto; and

Fig. 5 is a side-elevation view of the second embodiment showing, in solid lines, the structure in its erect position ready for use, and, in broken lines, the structure as collapsed to facilitate storage and carrying.

The first embodiment shown in Figs. 1, 2, and 3, hereinafter referred to as a "copy stand" and designated generally by the numeral 10, is designed to accommodate smaller subjects, for example, those up to

3 inches $\times$ 3 inches in area, the area to be occupied by a subject being designated generally by the numeral 11. The copy stand 10 includes a frame 12 having side portions, a base portion 13 delimiting the subject area 11, and a camera-mounting portion 14. Attached to the camera-mounting portion 14, by known fastening means such as rivets 15, is a camera-clamping assembly which comprises an L-shaped clamp base 17 and an adjustable L-shaped clamping member 18. Vertical adjustment of clamping member 18 is provided by knob 19, which is rotatably mounted on a shaft that passes through a vertical slot in the vertical leg of clamping member 18 and is fixed to the vertical leg of clamp base 17. The face of knob 19 adjacent to clamping member 18 is provided with a pair of cam surfaces which bear against corresponding vertically elongated bosses on the vertical leg of clamping member 18 in order to effect tightening or loosening of member 18 with respect to clamp base 17 by a simple turn of knob 19. In the horizontal leg of clamping member 18 is a slot 26 that enables viewing of the film-frame-number window of a camera clamped in the assembly 16, as best seen in Fig. 2.

Fixed in camera-mounting portion 14 and clamp base 17 is an auxiliary lens assembly 20, the optical axis of which intersects the centre of subject area 11. The function of the auxiliary lens is to aid in focusing the camera on the subject presented in subject area 11.

Fixed to the frame 12 between camera-mounting portion 14 and base portion 13, and the transversely joining side portions of the frame, are an L-shaped baffle 21 and a reflector 22. As will be seen, the generally downward extending leg 21a of baffle 21 is positioned to prevent camera flash illumination from striking the subject area 11 directly. Similarly, the horizontal leg 21b at the lower end of the baffle 21 is positioned to prevent camera flash illumination reflected by a reflector 22 from striking the auxiliary lens 20 directly. A portion of the upper surface of the reflector 22 is covered with an adhesive-backed reflective cloth having a diffuse surface 23, such as that used in photographic projection screens, to attenuate and reflect camera flash illumination on to the subject area 11. Reflector 22 is positioned to reflect camera flash illumination on to the subject area 11 in a substantially uniform manner. In addition, the diffuse surface 23 is positioned, with respect to the subject area 11, the baffle 21, and the auxiliary lens assembly 20, to prevent an image of this surface 23 from being reflected into the camera field of view by a secular surface lying in subject area 11, with consequent fogging of the resulting photograph.

In Fig. 3 a camera 24 having a flash-

cube 25 mounted thereon is shown clamped to the copy stand 10. With reference to Fig. 3, point O in the subject plane designates the geometrical centre of the subject area 11. Line OP designates the optical axis of the camera and auxiliary lenses, which is perpendicular to the subject plane. Points A and B in the subject plane designate those points on the perimeter of the subject area 11 that are, respectively, closest to and farthest from the diffuse surface 23. Similarly, points C and D in the subject plane designate those points on the perimeter of the illuminated area (within which subject area 11 falls) that are, respectively, closest to and farthest from the diffuse surface 23. Points E and F in the reflector plane designate those points on the perimeter of the diffuse surface 23 that are, respectively, closest to and farthest from point C. Points G and H, in the flashcube-surface plane parallel with the subject plane, designate those points from which flash illumination emanates that are, respectively, closest to and farthest from camera 24. Points J and K, in the plane of horizontal leg 21b of baffle 21, designate those points on the perimeter of leg 21b that are, respectively, closest to and farthest from the camera field of view. Point K also represents the bottom edge of leg 21a of baffle 21, i.e., the vertex of the light-baffling surfaces of legs 21a and 21b.

As indicated by dashed line HA, the baffle 21 is positioned to extend horizontally into the field of flash illumination just far enough, as at point K, to prevent flash illumination from striking the subject area 11 directly. Similarly, leg 21b of baffle 21 extends horizontally in the opposite direction far enough to prevent flash illumination reflected by reflector 22 from striking the auxiliary lens 20 directly but, as at point J, not so far as to enter the camera field of view, which is shown bounded by the phantom lines delimiting the camera field angle Z. Also, baffle 21 is positioned to extend vertically downward far enough to satisfy the foregoing requirements but, as at point K, not so far as to enter the field of flash illumination being reflected by the diffuse surface 23 on to the subject plane.

The diffuse surface 23 on reflector 22 is positioned to reflect flash illumination on to an area in the subject plane that is slightly larger than, and includes, the subject area 11. Accordingly, the upper and lower limits F and E of diffuse surface 23 are located, with respect to the flashcube 25, the subject area 11, and the baffle 21, to delimit the field of flash illumination received from the flashcube 25 as shown by dotted lines HF and GE, respectively, and the field of flash illumination reflected on to the subject plane as shown by dotted lines ED and EC, respectively, while avoiding interference with either of the

said fields of illumination by any part of baffle 21 such as point K. As viewed from point A, diffuse surface 23 subtends an angle α included between dashed lines AF and AE. Similarly, as viewed from point B, diffuse surface 23 subtends an angle β included between dashed lines BF and BE.

Point A receives illumination I_A reflected from diffuse surface 23 in direct proportion to the subtended angle α and in inverse proportion to the square of its distance from this surface. Similarly, point B receives illumination I_B reflected from diffuse surface 23 in direct proportion to the subtended angle β and in inverse proportion to the square of its distance from this surface. Although point B is more distant from the diffuse surface than is point A, the resulting greater inverse-square loss in illumination at point B is at least partially compensated for by the greater magnitude of angle β as compared with angle α , resulting in substantially uniform illumination between points A and B. It should be noted in this regard that both baffle 21 and diffuse surface 23 extend completely across the width of frame 12, joining the side portions thereof, to provide such substantially uniform illumination from one side to the other, i.e., over the entire subject area.

Still referring to Fig. 3, angle Y is the angle included between (1) the shortest straight line in the subject plane joining points O and A and (2) a light ray, in that plane perpendicular to the subject plane which contains the said shortest straight line, passing from point A directly to the auxiliary lens. As shown, angle Y is limited not only by the field angle provided by the camera and auxiliary lenses but also by the extent, if any, to which the baffle intrudes into the corresponding field of view. Angle X is the maximum angle that can be included between (1) an extension of the said shortest straight line extending from point O radially outward in the subject plane beyond point A and (2) a light ray, in the said plane perpendicular to the subject plane, passing from point A directly to the diffuse surface. As can be seen, angle X is limited not only by the size of the diffuse surface, i.e., its dimensions, but also by the horizontal, vertical, and angular position of the diffuse surface relative to point A.

Now, if angle Y were less than angle X, and if a flat and specular subject such as a glossy photographic print were lying in the subject plane within the subject area, then an image of all or part of the diffuse surface would be reflected by the said subject into the camera field of view, causing a fogging of the resulting photograph. To prevent that from occurring, angle Y must be at least as great in magnitude as angle X, preferably greater as shown in Fig. 3.

Operation of the copy stand 10, illustrated

in Figs. 1, 2, and 3, is simple. First, knob 19 is turned in its loosening direction to permit sliding of the adjustable clamping member 18 upwardly as needed for insertion of a camera 24 between the horizontal legs of clamping member 18 and the clamp base 17. As shown, camera 24 is inserted so that its lens faces the auxiliary lens assembly 20 and its flash unit 25 face baffle 21 and reflector 22. Clamping member 18 is then pushed downward until its horizontal leg abuts the rear wall of camera 24, after which knob 19 is turned in its tightening direction to lock the clamping member 18 and camera 24 in position. With the subject to be photographed placed in the subject area 11, a flash exposure thereof can then be made by operating camera 24 in the usual manner.

The embodiment shown in Figs. 4, 4a, and 5, hereinafter also referred to as a "copy stand" and designated generally by the numeral 100, differs from copy stand 10, shown in Figs. 1, 2, and 3, in these respects:

(1) it may be larger, accommodating, for example, subjects of up to 8 inch $\times$ 8 inch in area;

(2) it is collapsible, making it easy to store and transport; and

(3) it is provided with a removable handle, of the pistol-grip type, to facilitate use of the stand while being hand-held.

The copy stand 100 includes a channel-shaped frame 120 having side portions 121 each of which is provided with an elongated slot 122 having an offset portion 123 at one end thereof, to receive a shaft 124 extending across the width of the frame 120, through each slot 122, and beyond each side portion 121. As viewed in the erect position of stand 100, the upper end of frame 120 constitutes a camera-mounting portion 140, to which is attached, by known fastening means such as rivets, a camera-clamping assembly 160 that is identical to the camera-clamping assembly 16 shown in Figs. 1, 2, and 3 and described with reference to the copy stand 10. Fixed in the camera-mounting portion 140 is an auxiliary lens assembly 200 that is identical to the lens assembly 20 in copy stand 10 except for different optical characteristics necessitated by the greater subject area and camera-to-subject distance in copy stand 100. Extending generally downward from camera-mounting portion 140, and transversely joining side portions 121, is a baffle 210 whose functions are the same as those of baffle 21 in copy stand 10. At the lower end of baffle 210 is a generally horizontal portion 211, corresponding to the horizontal leg 21b of baffle 21 in copy stand 10, that extends immediately beneath the lower end of slot 122 in each side portion 121. Fixed to the upper surface of portion 211 is a detent spring 212 that biases a shaft 124 in its fully seated position in the offset portion 123

of each slot 122. At the lower end of frame 120 is pivotally attached, a by a push stud 125 in a receiving hole at the lower end of each side portion 121, a horizontal U-shaped base 130 that delimits the subject area as does base portion 13 of copy stand 10. Similarly attached to the middle portion of each leg of base 130, by push stud 131, is the lower end of one leg of a generally U-shaped reflector-support member 220. The middle portion of each leg of member 200 is, in turn, pivotally attached to one end of shaft 124, which protrudes through a hole in the said middle portion and is capped by a speed nut 221. The upper portion of the member 220, transversely joining the leg portions thereof, constitutes the reflector portion, whose upward-facing surface is covered with an adhesive-backed reflective cloth having a diffuse surface 230 that performs the same function as does the diffuse surface 23 in copy stand 10. As shown in Fig. 4a, the copy stand 100 may be provided with a detachable handle of the pistol-grip type, designated generally by the numeral 135, to aid in holding the stand in the absence of a supporting surface.

As mentioned above, the functions of and relationships between the elements comprising the copy stand 100 are the same as those previously described with reference to the like elements of copy stand 10. Operation of the two stands is likewise the same after stand 100 has been extended to its erect position, shown in solid lines in Fig. 5. To collapse stand 100 to the position shown in broken lines in Fig. 5, sufficient downward pressure must first be exerted upon the nuts 221 to overcome the biasing force of the detent spring 212 and push the shaft 124 out of the offset slot portion 123 and into the main portion of each slot 122. Pressure can then be applied to the nuts 221 in a generally upward direction to start movement of shaft 124 upwardly in slots 122. Camera-mounting portion 140 can then be pulled towards the open end of base 130, causing frame 120 to pivot about studs 125, reflector-support member 220 to pivot about studs 131, and shaft 124 to slide in slots 122 towards the camera-mounting portion. Such movement is continued until stand 100 is completely collapsed as shown by the broken lines in Fig. 5. Reversal of this procedure will restore the stand to its erect position. The pistol-grip handle 135, shown in Fig. 4a, can easily be removed or attached by turning screw 136 out of or into a mating threaded hole, not shown, in the end portion of base 130.

In summarizing the two embodiments just described, it will be noted that both copy stands 10 and 100 are devices that maintain a photoflash camera and the subject to be photographed in a relationship suitable for making close-up photographs, such that light

from the camera flash unit is used to illuminate the subject through means effecting an appropriate level of substantially uniform, non-glaring, indirect illumination of the subject area. The source of flash illumination, a multilamp flash package of the flashcube type attached to the camera, is simple, inexpensive, and compact and the copy stands are therefore readily usable regardless of the availability of ambient lighting means.

While the foregoing description relates to two specific embodiments of this invention adapted particularly for use with a camera utilizing a multilamp flash unit of the flashcube type, it should be apparent that the same inventive concepts and novel features could be embodied in structures adapted for use with cameras including or adapted to support different types of photoflash units.

WHAT WE CLAIM IS:—

1. Photographic apparatus, for use in making close-up photographic flash exposures with a photoflash camera, which comprises a frame having a first portion delimiting a camera-subject area and a second portion providing a camera-mounting surface, means for detachably securing a photoflash camera to the camera-mounting surface so that the camera lens faces the camera-subject area, a reflector fixed to said frame between the camera-mounting surface and the camera-subject area and having a diffuse surface thereon to attenuate and reflect on to the camera-subject area the flash light from the photoflash camera when secured to the camera-mounting surface, and a baffle fixed to the frame to prevent camera flash light from striking the camera-subject area directly and from being reflected by the reflector directly into the camera lens.

2. Photographic apparatus as claimed in Claim 1 and including an auxiliary lens fixed to the frame and adapted to adjust the camera focus to a plane substantially coincident with the camera-subject area.

3. Photographic apparatus as claimed in Claim 1, wherein the said diffuse surface is positioned with respect to the frame by a relationship in which the angle subtended by the said diffuse surface at a point on that part of the perimeter of the camera-subject area which is farthest from the said diffuse surface, is greater than the angle subtended by the said diffuse surface at a point on that part of the perimeter of the camera-subject area which is closest to the said diffuse surface.

4. Photographic apparatus as claimed in Claim 2, wherein the baffle and the said diffuse surface are dimensioned and oriented with respect to the frame by a relationship in which the angle included between (1) the shortest straight line, in the plane of the camera-subject area, joining the centre of the

of each slot 122. At the lower end of frame 120 is pivotally attached, a by a push stud 125 in a receiving hole at the lower end of each side portion 121, a horizontal U-shaped base 130 that delimits the subject area as does base portion 13 of copy stand 10. Similarly attached to the middle portion of each leg of base 130, by push stud 131, is the lower end of one leg of a generally U-shaped reflector-support member 220. The middle portion of each leg of member 200 is, in turn, pivotally attached to one end of shaft 124, which protrudes through a hole in the said middle portion and is capped by a speed nut 221. The upper portion of the member 220, transversely joining the leg portions thereof, constitutes the reflector portion, whose upward-facing surface is covered with an adhesive-backed reflective cloth having a diffuse surface 230 that performs the same function as does the diffuse surface 23 in copy stand 10. As shown in Fig. 4a, the copy stand 100 may be provided with a detachable handle of the pistol-grip type, designated generally by the numeral 135, to aid in holding the stand in the absence of a supporting surface.

As mentioned above, the functions of and relationships between the elements comprising the copy stand 100 are the same as those previously described with reference to the like elements of copy stand 10. Operation of the two stands is likewise the same after stand 100 has been extended to its erect position, shown in solid lines in Fig. 5. To collapse stand 100 to the position shown in broken lines in Fig. 5, sufficient downward pressure must first be exerted upon the nuts 221 to overcome the biasing force of the detent spring 212 and push the shaft 124 out of the offset slot portion 123 and into the main portion of each slot 122. Pressure can then be applied to the nuts 221 in a generally upward direction to start movement of shaft 124 upwardly in slots 122. Camera-mounting portion 140 can then be pulled towards the open end of base 130, causing frame 120 to pivot about studs 125, reflector-support member 220 to pivot about studs 131, and shaft 124 to slide in slots 122 towards the camera-mounting portion. Such movement is continued until stand 100 is completely collapsed as shown by the broken lines in Fig. 5. Reversal of this procedure will restore the stand to its erect position. The pistol-grip handle 135, shown in Fig. 4a, can easily be removed or attached by turning screw 136 out of or into a mating threaded hole, not shown, in the end portion of base 130.

In summarizing the two embodiments just described, it will be noted that both copy stands 10 and 100 are devices that maintain a photoflash camera and the subject to be photographed in a relationship suitable for making close-up photographs, such that light

from the camera flash unit is used to illuminate the subject through means effecting an appropriate level of substantially uniform, non-glaring, indirect illumination of the subject area. The source of flash illumination, a multi-lamp flash package of the flashcube type attached to the camera, is simple, inexpensive, and compact and the copy stands are therefore readily usable regardless of the availability of ambient lighting means.

While the foregoing description relates to two specific embodiments of this invention adapted particularly for use with a camera utilizing a multilamp flash unit of the flashcube type, it should be apparent that the same inventive concepts and novel features could be embodied in structures adapted for use with cameras including or adapted to support different types of photoflash units.

WHAT WE CLAIM IS:—

1. Photographic apparatus, for use in making close-up photographic flash exposures with a photoflash camera, which comprises a frame having a first portion delimiting a camera-subject area and a second portion providing a camera-mounting surface, means for detachably securing a photoflash camera to the camera-mounting surface so that the camera lens faces the camera-subject area, a reflector fixed to said frame between the camera-mounting surface and the camera-subject area and having a diffuse surface thereon to attenuate and reflect on to the camera-subject area the flash light from the photoflash camera when secured to the camera-mounting surface, and a baffle fixed to the frame to prevent camera flash light from striking the camera-subject area directly and from being reflected by the reflector directly into the camera lens.

2. Photographic apparatus as claimed in Claim 1 and including an auxiliary lens fixed to the frame and adapted to adjust the camera focus to a plane substantially coincident with the camera-subject area.

3. Photographic apparatus as claimed in Claim 1, wherein the said diffuse surface is positioned with respect to the frame by a relationship in which the angle subtended by the said diffuse surface at a point on that part of the perimeter of the camera-subject area which is farthest from the said diffuse surface, is greater than the angle subtended by the said diffuse surface at a point on that part of the perimeter of the camera-subject area which is closest to the said diffuse surface.

4. Photographic apparatus as claimed in Claim 2, wherein the baffle and the said diffuse surface are dimensioned and oriented with respect to the frame by a relationship in which the angle included between (1) the shortest straight line, in the plane of the camera-subject area, joining the centre of the



camera-subject area and a point on that part of the perimeter of the camera-subject area which is closest to the said diffuse surface, and (2) a light ray, in that plane perpendicular to the plane of the camera-subject area which contains the said shortest straight line, passing from the said point on the perimeter directly to the auxiliary lens, is at least as great in magnitude as the maximum angle includable between (1) an extension of said shortest straight line extending from the said centre radially outwards beyond the said point on the perimeter and (2) a light ray, in the said plane perpendicular to the plane of the camera-subject area, passing from the said point on the perimeter directly to the said diffuse surface.

5. Photographic apparatus as claimed in Claim 1, wherein the first frame portion comprises a base for the frame having an opening therein delimiting the camera-subject area.

6. Photographic apparatus as claimed in Claim 1, having at least two parts which are hinged to each other to render the said apparatus collapsible.

7. Photographic apparatus as claimed in Claim 6, further comprising a handle removably attached to the frame to aid in holding the apparatus.

8. Photographic apparatus, for use in making close-up photographic flash exposures with a photoflash camera, which comprises a base defining a camera-subject area; a frame

hinged at one end to the base, having at the other end adjustable clamping means for securing a photoflash camera in position to photograph the camera-subject area, and supporting between the said one end and the said other end a baffle which in the operative condition of the apparatus can prevent camera flash light from striking the camera-subject area directly, and can prevent camera flash light from being reflected directly into the camera lens; and a member hingedly connected at one end to the base, both hingedly and slidably connected at a mid-portion to the frame, and supporting at the other end a reflector having a diffuse surface to attenuate and reflect camera flash illumination on to the camera-subject area.

9. Photographic apparatus as claimed in any preceding claim, including a photoflash camera secured in position to photograph the camera-subject area and carrying a photoflash unit to illuminate this area.

10. Photographic apparatus for use in taking close-up photographs with a photoflash camera, constructed and adapted to operate substantially as hereinbefore described with reference to Figures 1, 2, and 3 or Figures 3, 4, 4a and 5 of the accompanying drawings.

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