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E. B. NOEL ET AL

2,485,403

MULTIPLE FLASH LAMP DEVICE

Filed April 27, 1944

2 Sheets-Sheet 1

FIG. 3

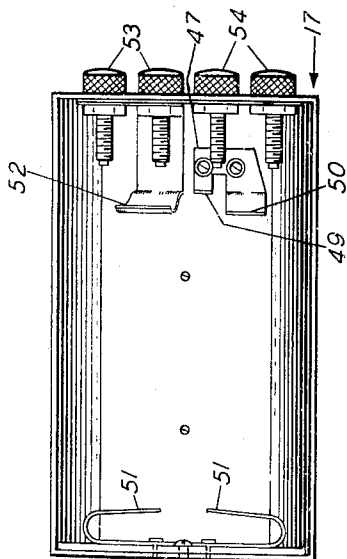
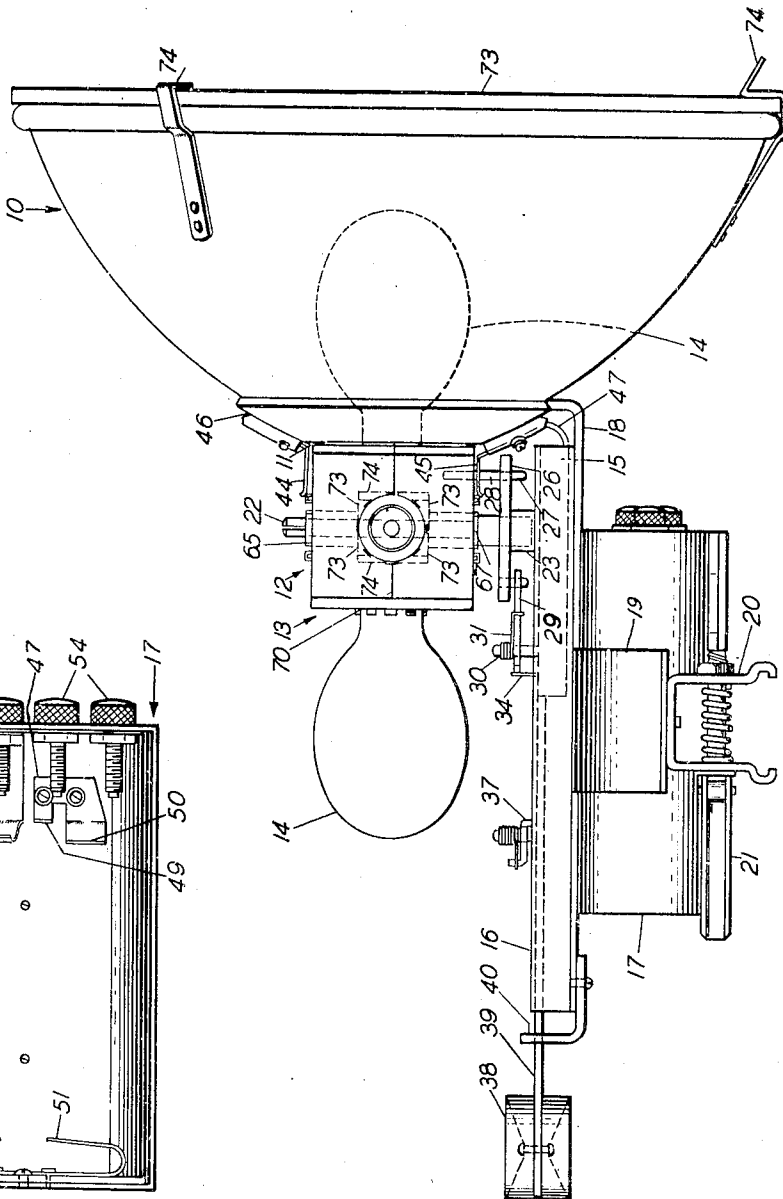


FIG. 1



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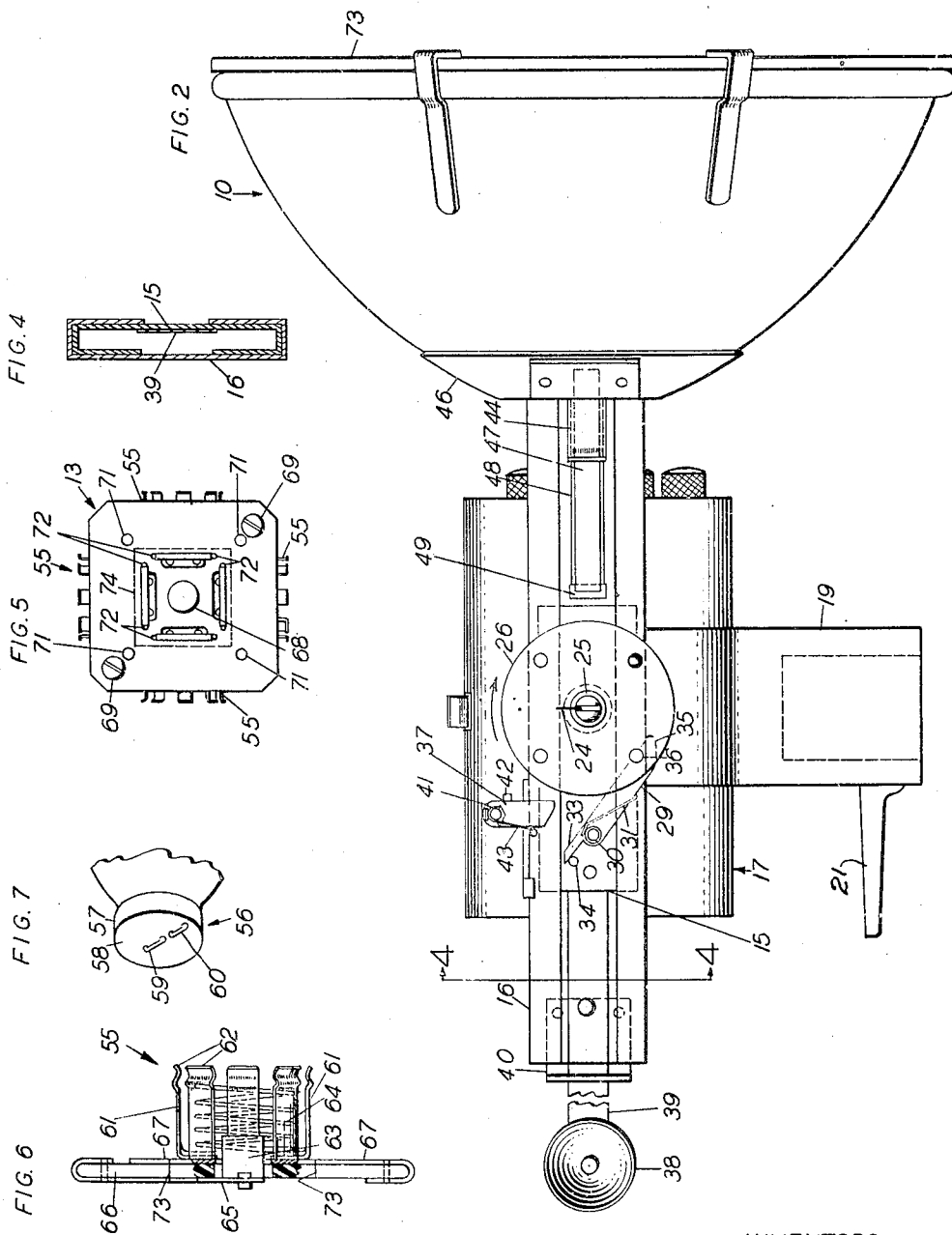
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UNITED STATES PATENT OFFICE

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MULTIPLE FLASH LAMP DEVICE

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Application April 27, 1944, Serial No. 532,938

3 Claims. (Cl. 240—37)

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Our invention relates to illuminating apparatus for photographic purposes and its principal object is to provide an apparatus of this kind capable of emitting a multiplicity of flashes of light in rapid succession to enable a photographer to take a series of pictures in a short time. Further objects and advantages of the invention will be apparent from the following detailed description of species thereof and from the appended claims.

In the drawing accompanying and forming part of this specification a species of our invention is shown in which, Fig. 1 is a top or plan view of a multiple flash apparatus embodying my invention; Fig. 2 is a side elevational view of the apparatus shown in Fig. 1 with the lamp holder removed; Fig. 3 is an elevational view of the battery case of the apparatus shown in Figs. 1 and 2 and as seen from the side; Fig. 4 is a sectional view along the line 4—4 of Fig. 2; Fig. 5 is a side view of the turret of Fig. 1; Fig. 6 is an enlarged, sectional, elevational view of a socket useful in the apparatus of Figs. 1 to 5 and Fig. 7 is an enlarged perspective view of a lamp base insertable in the socket of Fig. 6.

Referring to Figs. 1 and 2 of the drawing, our multiple flash lamp apparatus or device comprises a concave reflector 10 such as a parabolic reflector, having an opening 11 at its vertex through which a flash lamp may be moved into and out of the reflector 10, a turret 12 having a removable lamp holder 13 on which a plurality of flash lamps 14 may be radially mounted with their axes in a common plane including the reflector axis and normal to the axis of rotation of the turret 12. The turret 12 is mounted on a carrier part or slide 15 which is mounted for reciprocation toward and away from the reflector 10 and in a path parallel to the reflector axis. The slide 15 moves along a guide or track 16 and is arranged to carry the turret 12 away from the reflector a sufficient distance to completely withdraw from the reflector 10 the lamp 14 enclosed thereby so that the holder 13 may be rotated to bring another lamp into position to be moved through the opening 11 and into the reflector 10 when the slide 15 is moved back toward the reflector 10. Means described later herein are provided for causing rotation of the turret 90 degrees about its axis after a lamp 14 has been removed from the reflector 10. Thus, the lamps 14 may be easily inserted into and removed from the reflector 10 in rapid sequence for being flashed in rapid succession. The means for effecting and controlling the ignition of the lamp 14 enclosed by the reflector 10 is described below.

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The reflector 10, the guide 16 and a battery case 17 are permanently secured, as by welding, to a support member 18 which is provided with an outwardly extending arm 19 having thereon a spring clamp 20 comprising a handle 21 for ready engagement of the multiple flash apparatus with a conventional support member which may be mounted on a camera in the well-known manner.

The turret 12 comprises a shaft or spindle 22 for supporting lamp holder 13. The spindle 22 is mounted in a bushing 23 on the slide 15, has a spring wedge 24 at its outer end and increases in diameter abruptly a substantial distance from its wedge supporting end to form a shoulder 25 against which the holder 13 rests. The holder 13 is readily removable from and mountable on the spindle 22 by depressing the spring wedge 24 which normally holds the lamp holder 13 against the shoulder 25 and moving the holder longitudinally of the spindle. The spindle 22 also has an integral disc-like part 26 provided with pins 27 equally spaced along its periphery and projecting toward slide 15. One of the pins 27 has a part 28 extending toward and engaging with the holder 13 to rotate the latter when the spindle 22 and the disc 26 is rotated by the means described below. The slide 15 has means for indexing and holding the turret 12 with one of the lamps 14 in position to be moved through the opening 11 into and out of the reflector 10. The said means comprises an arm 29 pivotally mounted on a pivot post 30 which is provided with a spring 31 engaging with and urging arm 29 toward the path of travel of the pins 27. The movement of arm 29 in this direction is limited by the extension 33 thereof which engages a stationary pin or stop 34 on the slide 15. The arm 29 has a tapered or wedge-shaped end 35 and a pin engaging recess 36 spaced from said end 35 (Fig. 2). As the disc 26 is rotated through a 90 degree arc in the direction of the arrow (Fig. 2) by the means described below the pins 27 are successively engaged by the recess 36 in arm 29 which thus holds the turret 12 stationary between its rotational movements with one of the lamps 14 in position to be moved into and out of the reflector.

The rotation of the disc 26 and therewith the turret 12 to change a lamp in reflector 10 is effected by moving slide 15 in guide 16 away from reflector 10 to cause a pin 27 to engage an arm 37 mounted on the guide 16. The arm 37 is offset from the axis of rotation of disc 26 so that a turning moment is exerted on the latter to rotate lamp holder 13 as the movement of slide 15 in

guide 16 is continued after a pin 27 engages arm 37. The means for moving slide 15 along guide 16 comprises a finger grip 38 on a handle 39 attached to the slide 15. A pull on the handle 39 is effective for moving the turret 12 from the position shown in Fig. 1 past the position shown in Fig. 2 and into the position in which the end of slide 15 hits a stop 40 attached to the end portion of guide 16 and through which passes the handle 39. The arm 37 is so disposed on guide 16 that rotation of holder 13 does not occur until lamp 14 is withdrawn from reflector 10 and has occurred when slide 15 has reached its limit of travel away from reflector 10. Thus, merely pulling handle 39 is effective for bringing an unflashed lamp 14 into position to be inserted in reflector 10 when turret 12 is moved back to the position shown in Fig. 1 by pushing handle 39.

The arm 37 is pivoted at 41 on the guide 16 and is provided with an integral stop 42 to limit its rotational movement in the direction away from reflector 10. The arm 37 is urged in this direction by a spring 43 fastened to the arm 37 and the pivot post 41. Thus, arm 37 is normally held by spring 43 and stop 42 in the position shown in Figs. 1 and 2 while turret 12 is moved away from reflector 10 but may be moved toward the reflector 10 to permit a pin 27 to pass by without turning disc 26 as turret 12 is moved back toward reflector 10. The free end of arm 37 is beveled as shown to facilitate such passing of a pin 27.

When the turret 12 is in the position shown in Fig. 1 the lamp 14 enclosed by the reflector 10 is connected across a pair of contacts 44 and 45 mounted in diametrically opposed positions on the annular part 46 of support 18 for reflector 10. The upper contact 44 is secured directly to, while the lower contact 45 is electrically insulated from said part 46. An electrical conductor 47 insulated by strip 48 from guide 16 extends from contact 45 along guide 16 and passes through opening 49 into battery case 17 for connection with one terminal of a battery of cells (not shown) disposed in said case 17. Spring contacts 50, 51 and 52 are secured to the case 17 and are arranged to support and connect two cells in series. The conductor 47 is connected to the contact 50, contact 51 engages the positive terminal of one cell and the negative terminal of the other cell to connect the cells in series. Both of said contacts 50 and 51 and conductor 47 are electrically insulated from the case 17 and contact 52 is electrically connected to said case 17. A plurality of terminal buttons or sockets 53 and 54 are provided on the case 17. Two of the sockets may be used for accommodating the ends of electrical conductors of a switch for making and breaking the circuit including the battery in case 17 and contacts 44 and 45 and thus controlling the ignition of the lamp 14 connected across said contacts 44 and 45. The other sockets may be used for connecting other photo-flash lamps in parallel with that in reflector 10 in the conventional manner. A conventional manually or automatically controlled switch may be used for controlling lamp ignition so that the flash of the lamp may be synchronized with the opening of the camera shutter. One group of sockets 53 is connected to contact 52 and the other group of sockets 54 is electrically connected to the contact 50.

The lamp holder 13 comprises four lamp accommodating sockets 55 facing in four different directions as shown in Fig. 5. One socket is

shown in detail in Fig. 6. The socket 55 shown in Fig. 6 accommodates the lamp base 56 shown in Fig. 7. The base 56 is of the type disclosed in the Fulton and Foote application Serial No. 461,573 filed October 10, 1942, issued as Patent No. 2,424,446, July 22, 1947, and assigned to the assignee of this application and comprises a cylindrical rim 57, a disc-like web 58 and a pair of contacts 59 and 60 on the web 58. The contacts 59 and 60 are eccentrically mounted on the web 58 with the contact 60 more eccentric than contact 59. The socket 55 comprises a plurality of annularly arranged spring fingers 61 the free ends 62 of which slip over the edge of rim 57 of base 56 when the latter is pushed into the socket 55 to hold the base contacts 59 and 60 firmly against socket contacts 63 and 64, respectively. The socket contact 63 is cylindrical and is yieldingly supported in the center of the socket by a resilient, electrical conductor 65 one end portion of which is bent over and bolted to an elongated insulating support member 66. The socket contact 64 is a helically coiled wire having a circular, free end and secured at the opposite end to the bottom of the spring fingers 61 which form a continuous cup-shaped surface which, in turn, is secured to an electrical conductor 67. One end portion of conductor 67 is bent over the other end of the member 66. Contact 63 is spaced from the other electrically conducting members of the socket except conductor 65. Conductor 65 is spaced from conductor 67 to prevent short circuits between these elements. When the socket is mounted in the holder 13 the bent-over portions of conductors 65 and 67 are exposed for engagement with circuit contacts 44 and 45 on reflector 10 as shown in Fig. 1.

The holder 13 has an aperture or passage 68 therethrough for accommodating the spindle 22 of the turret 12 and cavities 71 for accommodating part 28 of pin 27 on disc 26. The holder 13 is hollow and is separable into two parts along the line 70 of Fig. 1 which parts are held together by removable bolts 69 (Fig. 5). The conductors 65 and 67 and the ends of member 66 pass through slots 72 in each part of holder 13. The mid-portion of member 66 is of greater width than the end portions thereof in slots 72 so that shoulders 73 (Figs. 1, 5 and 6) are formed where the width of member 66 changes. The shoulders 73 abut against the inner surface 74 of the hollow holder 13 to hold the socket 55 in proper position in said holder 13.

It will be understood that we contemplate that other types of lamp holders, lamp sockets and lamp bases may be used in place of those shown and described and that the lamp holder 13 may be used with other types of multiple flash apparatus. For example, the lamp holder 13 may, with slight modification, be used in apparatus similar to that disclosed in the John J. Malloy application Serial No. 508,480, filed November 1, 1943, issued as Patent No. 2,403,469, October 1, 1946 and assigned to the assignee of this application. In the aforesaid Malloy application the reflector is moved out of the path of the lamps when the lamp holder is rotated. Further, the lamp holder disclosed in the aforesaid Malloy application and which accommodates lamps provided with bayonet type bases may be used, if slightly modified, as part of the turret 12 of this application.

The lamps 14 are of the type disclosed in the Fulton and Foote application identified above and comprise beads of combustible material, such as

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those disclosed and claimed in the Pipkin Patent #2,291,983, issued August 4, 1942, supported in the bulb by a pair of current inleads which are bridged by an incandescible filament in contact with the said beads to ignite the latter. The lamps 14 are filled with a combustion supporting atmosphere, such as oxygen or air, at atmospheric pressure or lower and, when ignited, emit actinic radiation useful in taking photographs. A filter or screen 73 held by clips 74 over the mouth of the reflector 10 may be used to filter out or absorb radiation of certain wave lengths. For example, screen 73 may absorb substantially all of the visible light and transmit only infrared rays for picture taking purposes or screen 73 may be removed entirely from reflector 10 to make available all of the radiation emitted by lamp 14.

The holder 13 is claimed in the copending divisional application Serial No. 669,144, filed May 11, 1946, of Edward B. Noel.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A portable multiple flash lamp device comprising a support, a concave reflector affixed thereto for enclosing a flash lamp and having an opening spaced from its mouth for flash lamp replacements, stationary contacts of an ignition circuit for said lamps permanently juxtaposed to said reflector opening, and lamp replacement means mounted for reciprocation on said support in alignment with said opening to project and retract a lamp therethrough, said means comprising a rotatable spindle normal to the path of movement of said means, a lamp holder thereon radially supporting a plurality of lamps about said spindle and in a plane normal thereto and having contacts arranged in pairs for connecting a lamp in the reflector across the ignition circuit contacts, interlocking engagement means on said spindle and said holder for causing rotation of the holder on rotation of the spindle and means on said replacement means and said support for rotating said spindle an angular distance sufficient to bring successive lamps into alignment with the reflector opening on reciprocation of the lamp replacement means.

2. A portable multiple flash lamp device comprising a support, a concave reflector affixed thereto for enclosing a flash lamp and having an opening spaced from its mouth for flash lamp replacements, stationary contacts of an ignition circuit for said lamps mounted on said reflector and permanently juxtaposed to said reflector opening, and lamp replacement means slidably mounted for reciprocation on said support in alignment with said opening to project and retract a lamp therethrough, said means comprising a rotatable spindle normal to the path of movement of said means, a lamp holder thereon

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radially supporting a plurality of lamps about said spindle and in a plane normal thereto and having contacts arranged in pairs for connecting a lamp in the reflector across the ignition circuit contacts, interlocking engagement means on said spindle and said holder for causing rotation of the holder on rotation of the spindle and means on said replacement means and said support for rotating said spindle an angular distance sufficient to bring successive lamps into alignment with the reflector opening on reciprocation of the lamp replacement means.

3. A portable multiple flash lamp device comprising a support, a concave reflector affixed thereto for enclosing a flash lamp and having an opening spaced from its mouth for flash lamp replacement and lamp replacement means on said support for projecting and retracting a lamp through said opening, said means comprising a lamp holder having a central passage and a plurality of lamp sockets radially disposed about said passage and in a common plane normal thereto, a supporting spindle therefor extending through said passage and provided with means including a spring wedge at its end for clamping said holder thereon and having affixed thereto a coaxial disc provided with pins extending parallel to the spindle with one pin projecting into the holder for rotating the holder on rotation of the spindle, a slide member mounted for reciprocation on said support member with respect to said reflector opening and carrying said spindle, said spindle being mounted for rotation on said slide member and normal to its path of travel, and indexing means on said slide member comprising a spring pressed arm engaging one of said pins for aligning a lamp in the holder with the reflector opening and an arm on said support positioned in the path of movement of another of said pins to turn said spindle on retraction of said slide to bring successive lamps in the holder sockets into alignment with said reflector opening.

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