July 30, 1946. H. H. MAGDSICK 2,404,970

MULTIFLASH LAMP

Filed July 5, 1943 2 Sheets-Sheet 1

Fig. 1.

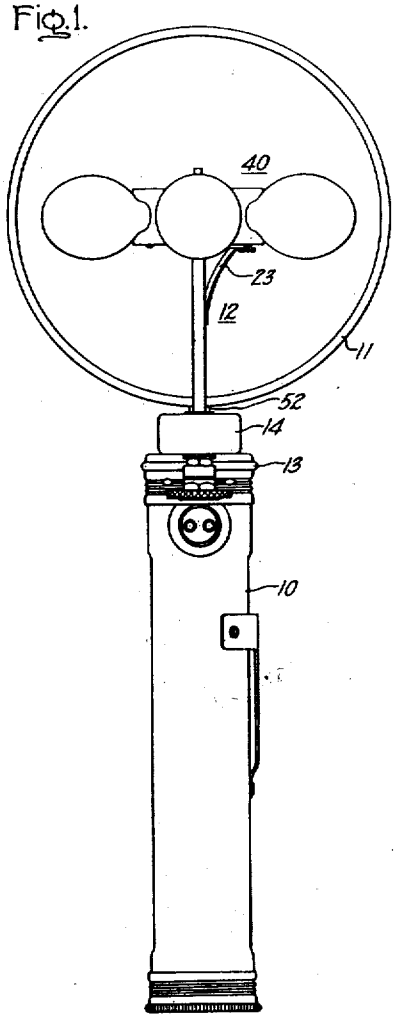


Fig. 3.

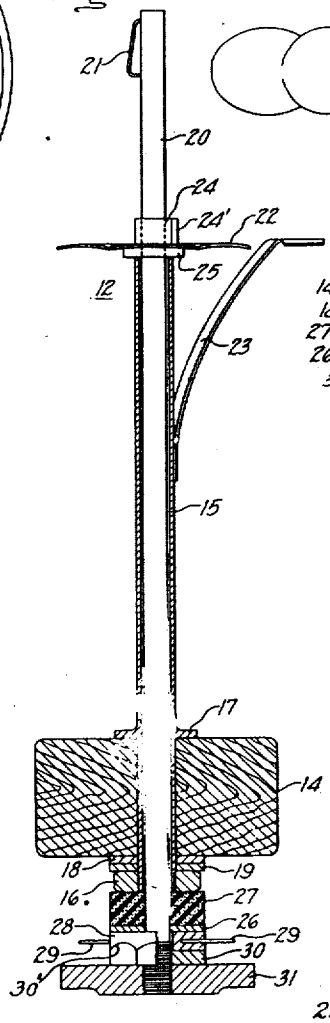


Fig. 2.

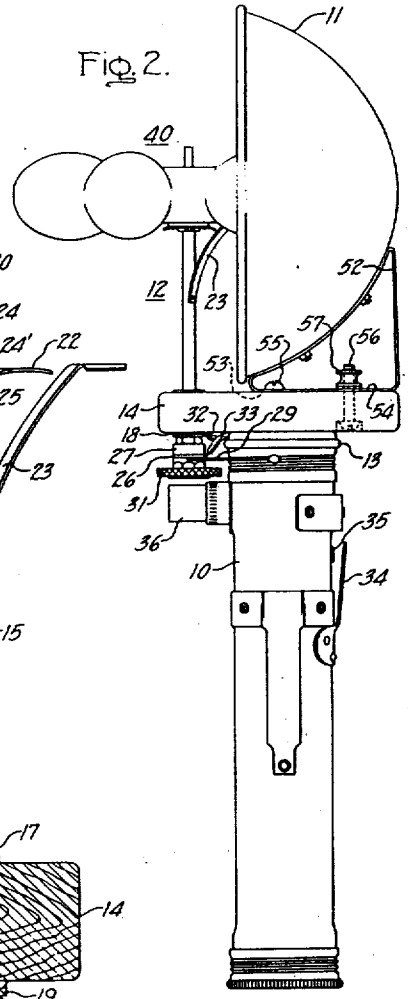


Fig. 4.

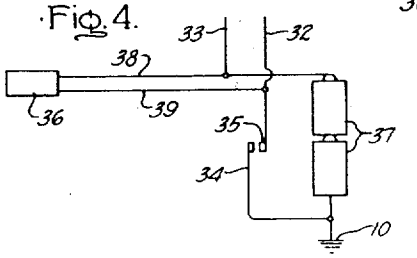
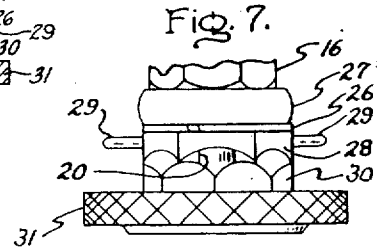


Fig. 7.



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Filed July 5, 1943 2 Sheets-Sheet 2

Fig. 5.

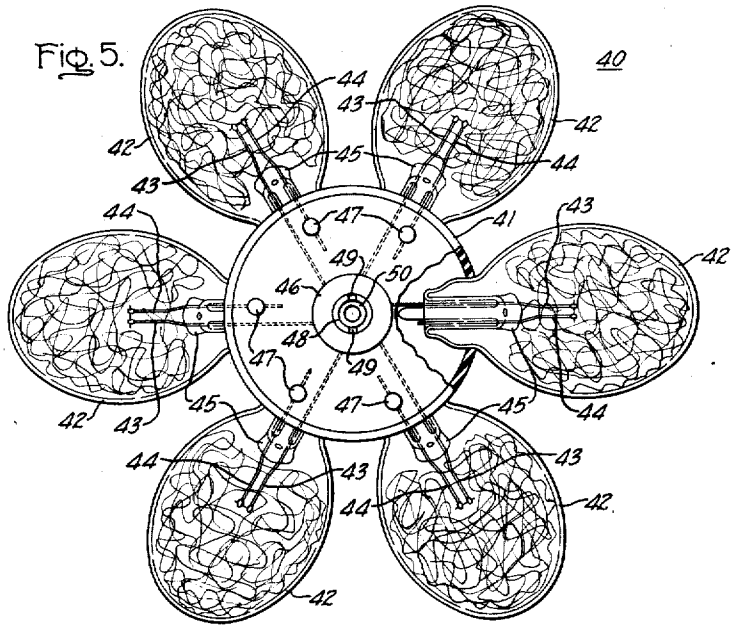
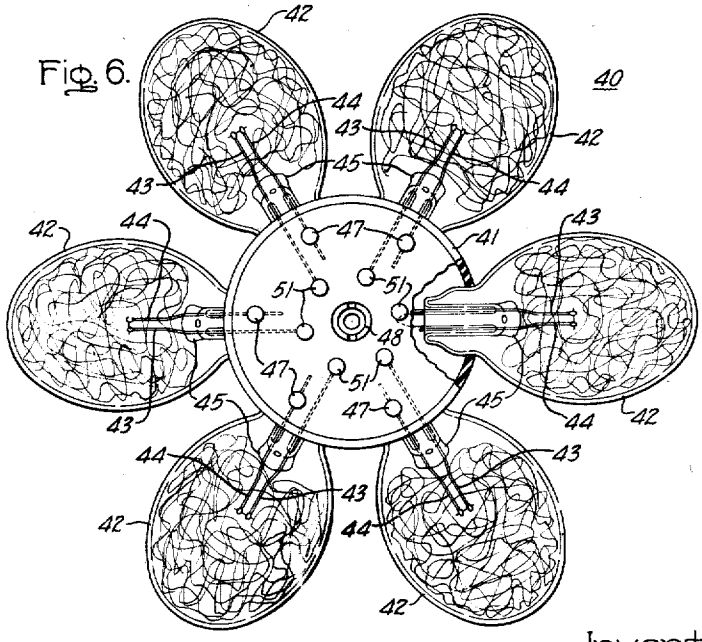


Fig. 6.



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UNITED STATES PATENT OFFICE

2,404,970

MULTIFLASH LAMP

Henry Herbert Magdsick, East Cleveland, Ohio, assignor to General Electric Company, a corporation of New York

Application July 5, 1943, Serial No. 493,519

4 Claims. (Cl. 240—37)

1

My invention relates to illuminating apparatus for photographic purposes and its principal object is to provide such an apparatus capable of projecting a multiplicity of light flashes in rapid succession to enable a photographer to take a series of pictures in a short time. A further object of my invention is to provide a multiflash lamp useful in my illuminating apparatus. Further objects and advantages of my invention will appear from the following detailed description of species thereof and from the appended claims.

In the drawings accompanying and forming part of this specification, species of my invention are shown in which Fig. 1 is a front elevational view of an illuminating apparatus embodying my invention with one species of my new multiflash lamp mounted therein; Fig. 2 is a side elevational view of the apparatus shown in Fig. 1; Fig. 3 is an enlarged, front elevational, partly sectional view of the lamp supporting part of the apparatus shown in Figs. 1 and 2; Fig. 4 is a circuit diagram showing the connections between the apparatus and an energy source; Fig. 5 is a bottom plan view of the multiflash lamp shown in Figs. 1 and 2; Fig. 6 is a similar view of another species of multiflash lamp useful in the apparatus shown in Figs. 1 to 3, and Fig. 7 is a fragmentary, front elevational view of the lower part of the lamp supporting means shown in Fig. 3 and on the same enlarged scale.

Referring to Figs. 1 to 3 of the drawings, my apparatus comprises a battery case 10, a reflector 11 of the parabolic type having a focal point and an axis of projection, and a lamp supporting member 12. The reflector 11 and the member 12 are secured to the cap 13 of the case 10 by a holding member, or bracket 14 of electrically insulating material, such as wood or fiber, bolted to said cap 13.

As shown in detail in Fig. 3, the lamp supporting member 12 comprises a metal sleeve 15 which passes through the holder 14 and is clamped thereto by the nut 16 and the shoulder 17 of the sleeve 15. A ring-contact 18 and a washer 19 are interposed and clamped between the holder 14 and the nut 16. An elongated, metal post or spindle 20 passes through and projects beyond each end of the sleeve 15. The upper, or lamp supporting, end portion of the spindle 20 has a spring-wedge 21 which serves to hold the lamp in engagement with the spring-contact 22 which is permanently and rigidly fastened, as by soldering, to the spindle 20. Another spring-contact 23 is similarly fastened to the sleeve 15 and spaced from the contact 22. The center portion 24 of

2

spring-contact 22 is larger in diameter than the spindle 20 and is provided with a ridge-like protuberance 24' extending longitudinally of the spindle 20. The protuberance 24' functions as a key engaging with a slot in the common base of the lamp to turn the lamp as the spindle 20 is turned, as explained in detail below. A washer 25 of electrically insulating material, such as fiber, leather, rubber, or the like, is interposed between the end of sleeve 15 and the spring-contact 22 and the part of the spindle 20 extending along sleeve 15 is also covered with electrically insulating material. The lower end portion of the spindle 20 is provided with a ring contact 26 which is electrically insulated from the adjacent end of the sleeve 15 by washer 27 of similar material as washer 25.

An indexing apparatus, shown in a fully indexed position in Fig. 3 and between indexing positions in Fig. 7, is provided on the lower end of the spindle 20 and comprises a stationary ring 28 secured to the cap 13 by supports 29 and a nut 30 engaging with the threaded end portion of the spindle 20. The engaging surfaces of said ring 28 and the nut 30 are provided with a plurality of notches corresponding in number to the number of bulbs in the lamp. The line of division between ring 28 and nut 30 is indicated at 30' in Fig. 3. The notches on ring 28 are so disposed with respect to the key 24' on the portion 24 of contact 22 that each time the nut 30 is turned one notch with respect to the ring 28, one bulb of the lamp is moved out of and another bulb moved into the focal point of the reflector 11. The washer 27 may be of compressible material, such as soft rubber, or a spring-washer may be interposed between contact 26 and ring 28 to permit slight longitudinal movement of ring 28 as nut 30 is rotated. A knurled wheel 31 is threaded onto the lower portion of the spindle 20 and butts against the nut 30 to lock both of these elements in position on the spindle 20. Longitudinal movement of the spindle 20 with respect to the sleeve 15 is limited by contact 22 and nut 30 while rotary movement of spindle 20 in sleeve 15 is accomplished by turning wheel 31 in the direction of the threads on spindle 20. Thus, spindle 20 is electrically insulated from, is supported by, and is rotatable in sleeve 15 with its axis of rotation normal to the axis of projection of the reflector 11.

The ring-contacts 18 and 26 of the sleeve 15 and the spindle 20, respectively, are connected to separate terminals of the battery cells in the flash light by the insulated wires 32 and 33, re-

spectively, passing through the cap 13 into the case 10.

The case 10 is of a well-known commercial type and, as shown in Fig. 2, comprises a metal switch member 34 secured thereto and a contact 35 insulated from said case 10. A socket 36 is provided on the case 10 which accommodates a plug having wires connected to an electromagnet for tripping the camera shutter. In Fig. 4 of the drawings, I have illustrated diagrammatically a circuit showing the connections from the battery cells to the socket 36 and the wires 32 and 33 of my illuminating apparatus connected into the circuit. The electromagnet and the plug for engagement with the socket 36 have been omitted for simplicity of illustration.

Referring to Fig. 4, the series-connected, conventional flashlight cells 37 are enclosed in and grounded to the case 10. One contact in the socket 36 on the case 10 and the spindle 20 of my new illuminating apparatus are connected to the center, or positive terminal of the battery cells by the conductor 38 and the wire 33, respectively. The other contact of socket 36 and the sleeve 15 of my illuminating apparatus are connected to the outer, or negative terminal of the battery of cells, when the member 34 engages contact 35, by conductor 39 and wire 32, respectively. Thus, the electromagnet for actuating the camera shutter and a bulb of the lamp may be connected and disconnected across the terminals of the battery, simultaneously and in parallel, by moving the switch member 34 on the case 10 into and out of engagement with the contact 35.

The multiflash lamp unit 40, best illustrated in Fig. 5 of the drawings, may be mounted on the lamp holder 12 shown in Figs. 1, 2 and 3, and comprises a common base or hub member 41 circular in shape and of electrically insulating material, such as fiber, hard rubber, or an electrically insulating, moldable plastic. Said base 41 has a plurality of bulbs 42 permanently secured therein and projecting radially from the peripheral portion thereof. The bulbs 42 are of ellipsoidal shape and are filled with a combustible material, such as shredded foil (indicated by the light lines in the drawings), and a supporter of combustion, such as oxygen. The combustible material, when ignited, produces a flash of actinic light and is ignited by an ignition means comprising a tungsten filament connected across a pair of current inlead wires 43 and 44 sealed into the stem 45 of the bulbs 42. Such bulbs are disclosed in U. S. Patent No. 2,306,563, issued December 29, 1942, to Marvin Pipkin.

The inlead wire 43 of each of the bulbs 42 is connected to the external, center ring contact 46 of the base 41. A plurality of equally spaced contacts 47, one for each of the inleads 44, are disposed adjacent the peripheral portion of the base 41. The center portion of the base 41 has a passage therethrough defined by a metal tube 48 of double bore. The larger-diameter portion of the tube 48 engages with the ring contact 46 on the base 41, accommodates the portion 24 of the contact 22 and has a pair of diametrically opposed slots 49, either one of which engages with the key 24' on the portion 24. The smaller-diameter portion of the tube 48 accommodates the spindle 20. A shoulder 50 is provided where the double-bore tube 48 changes in diameter.

The lamp 40 is mounted on the lamp holder 12 by placing the portion of larger diameter of the tube 48 over the end of spindle 20, moving the lamp base 41 longitudinally of the spindle 20 in the direction of the contact 22 until the key 24' enters one of the slots 49 and the key supporting portion 24 of the contact 22 enters the portion of larger diameter of the tube 48 with the end thereof abutting against the shoulder 50 in the tube 48. The lamp 40 is then clamped between the spring wedge 21 on the spindle 20 and the center portion 24 of contact 22 with the ring contact 46 and metal tube 48 engaging with the electrically conducting parts of the spindle 20 and with one of the outer contacts 47 engaging with the spring-contact 23 on the sleeve 15. One of the bulbs 42 of the lamp 40 will then be in the focal point of the reflector 11 and may be ignited by moving member 34 into engagement with contact 35 to provide a flash of actinic light suitable for photographic purposes. Member 34 is then released and moves away from contact 35. The flashed bulb may be moved out of the focal point and the next bulb moved into the focal point of reflector 11 by turning wheel 31 until nut 30 moves one notch with respect to ring 28. The new bulb may then be flashed in the same manner as the first bulb. The above described operation may be repeated until all the bulbs have been flashed. The lamp may then be removed by pressing spring wedge 21 against spindle 20 and lifting the lamp off the support 12.

The wheel 31 and the member 34 are so juxtaposed on the apparatus illustrated in Figs. 1 to 3 that the entire operation of turning the lamp 40 by the wheel 31 to bring successive bulbs 42 into the focal point of the reflector 11 and the ignition of the bulbs in sequence by pressing member 34 against contact 35 may be accomplished with one hand of the user. This is advantageous when the lighting apparatus is used at a distance from the camera and is held in one hand of the photographer. In this operation the portion of holder 14 projecting beyond the cap 13 in the direction away from the wheel 31 forms a convenient support as it rests against the photographer's hand.

The species of multiflash lamp 40 illustrated in Fig. 6 of the drawings is similar to that shown in Fig. 5 except for the provision of a plurality of contacts 51 in place of the single, center ring contact 46. The contacts 51 are disposed at such distance from the center of the base 41 that they engage with the outer peripheral portion of the spring contact 22 when the lamp 40 is mounted on the lamp holder 12. The double-bore tube 48 of this embodiment may consist of the same electrically insulating material as base 41 and be formed as an integral part thereof.

I prefer to so mount the reflector 11 on the holder 14 that the relative spacing between the reflector 11 and the lamp supporting member 12 may be changed. Multiflash lamps of different sizes may then be used in the apparatus and the apparatus may be adjusted to obtain a desired distribution of the projected light. To this end I have provided slots 53 and 54 in the lower part of support 52 of reflector 11. Bolts 55 and 56 pass through slots 53 and 54, respectively, and into the holder 14. Bolt 56 is provided with a knurled nut 57 which may be loosened sufficiently to permit longitudinal movement of the support 52 along the holder 14 against the clamping action of the bolt 55. Bolt 55 may be provided with a similar knurled nut, when desired.

It will be understood, of course, that I contemplate using my new apparatus with lamps of different structure than that shown in Figs. 5 and 6 and using my new multiflash lamp with apparatus of different structure than that shown in Figs.

1 to 4. Further, the apparatus may be separated from the battery case **10**, be provided with a handle, or the like, and elongated connecting wires **32** and **33** for use at appreciable distances from the case **10**.

The lamp unit **40** shown particularly in Figs. 5 and 6 is being claimed in divisional application Serial No. 523,237, filed February 21, 1944.

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

1. A portable photographic flash light device comprising a concave light-concentrating reflector, a spindle rotatably mounted in front of said reflector and extending substantially normal to the axis of said reflector, a rotary lamp unit comprising a hub member carrying individual flash lamps extending radially from said hub, said hub member having an axially extending passage for engagement with one end of said spindle to support the lamp unit in front of said reflector and in a plane including the reflector axis, interlocking engagement means on said spindle and hub for causing said lamp unit to rotate upon rotation of said spindle, the lamps being thereby successively movable into the focus of said reflector, and electric circuit means arranged to energize that lamp which is at the said focus of the reflector.

2. A portable photographic flash light device comprising a support member, a concave light-concentrating reflector carried by said support member, a tubular sleeve carried by said support member in front of said reflector and extending substantially normal to the axis of said reflector, a rotatably mounted spindle extending through said sleeve but spaced therefrom and adapted to support the hub of a rotary lamp unit in a plane including the reflector axis, and electrical contact members carried, respectively, by said spindle and by said sleeve for engagement with lamp contacts on said lamp unit.

3. A portable photographic flash light device

comprising a battery casing adapted to be held in a vertical position, a concave light-concentrating reflector supported at the upper end of said casing with its axis horizontal, a vertically extending spindle rotatably supported at the upper end of said casing in front of said reflector, a rotary lamp unit comprising a hub member carrying individual flash lamps extending radially from said hub, said hub member having an axially extending passage for engagement with the upper end of said spindle to support the lamp unit in front of said reflector and in a horizontal plane including the reflector axis, interlocking engagement means on said spindle and hub for causing said lamp unit to rotate upon rotation of the spindle, the lamps being thereby successively movable into the focus of said reflector, the lower end of said spindle being provided with finger-grippable means for its rotation, and electric circuit means arranged to energize that lamp which is at the focus of said reflector.

4. A portable photographic flash light device comprising a battery casing adapted to be held in a vertical position, a concave light-concentrating reflector supported at the upper end of said casing with its axis horizontal, a vertically extending sleeve supported at the upper end of said casing in front of said reflector, a rotatably mounted spindle extending through said sleeve but spaced therefrom and adapted to support at its upper end the hub of a rotary lamp unit so that the said lamp unit is in a horizontal plane including the axis of said reflector, the lower end of said spindle being provided with finger-grippable means for its rotation, and electrical contact members carried respectively by said spindle and by said sleeve for engagement with lamp contacts on said lamp unit, and means to electrically connect said contacts through said sleeve and spindle with a battery in said casing.

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