

Sept. 21, 1965

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3,207,890

FLASH-LAMP ASSEMBLY FOR CAMERAS

Filed July 9, 1962

3 Sheets-Sheet 1

Fig. 1

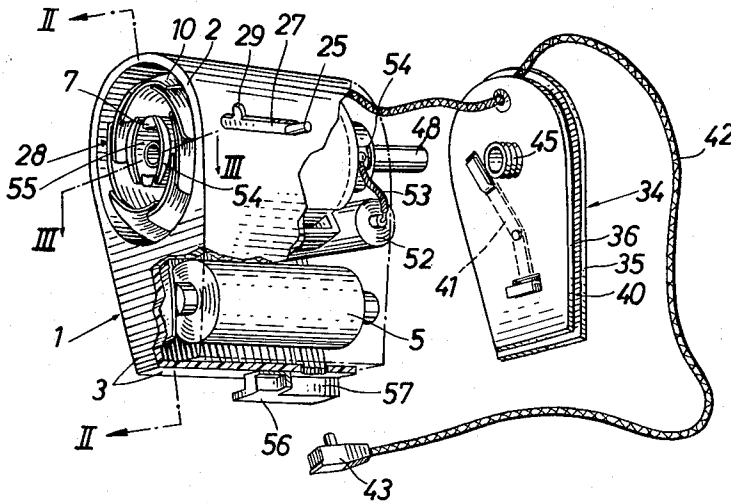
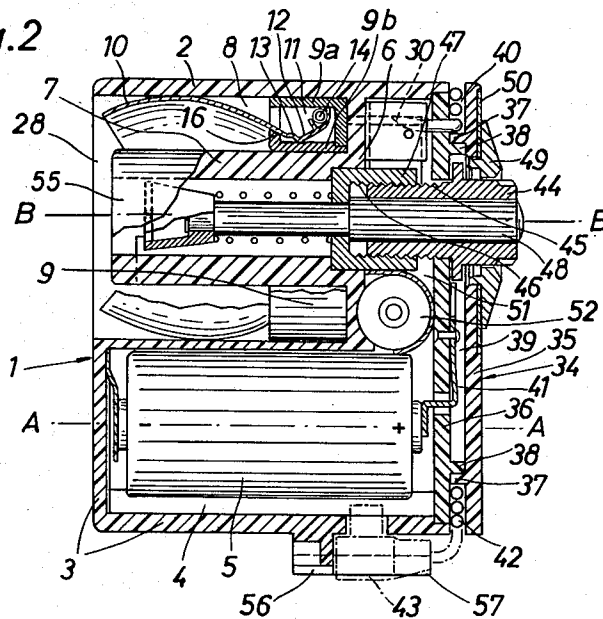


Fig. 2



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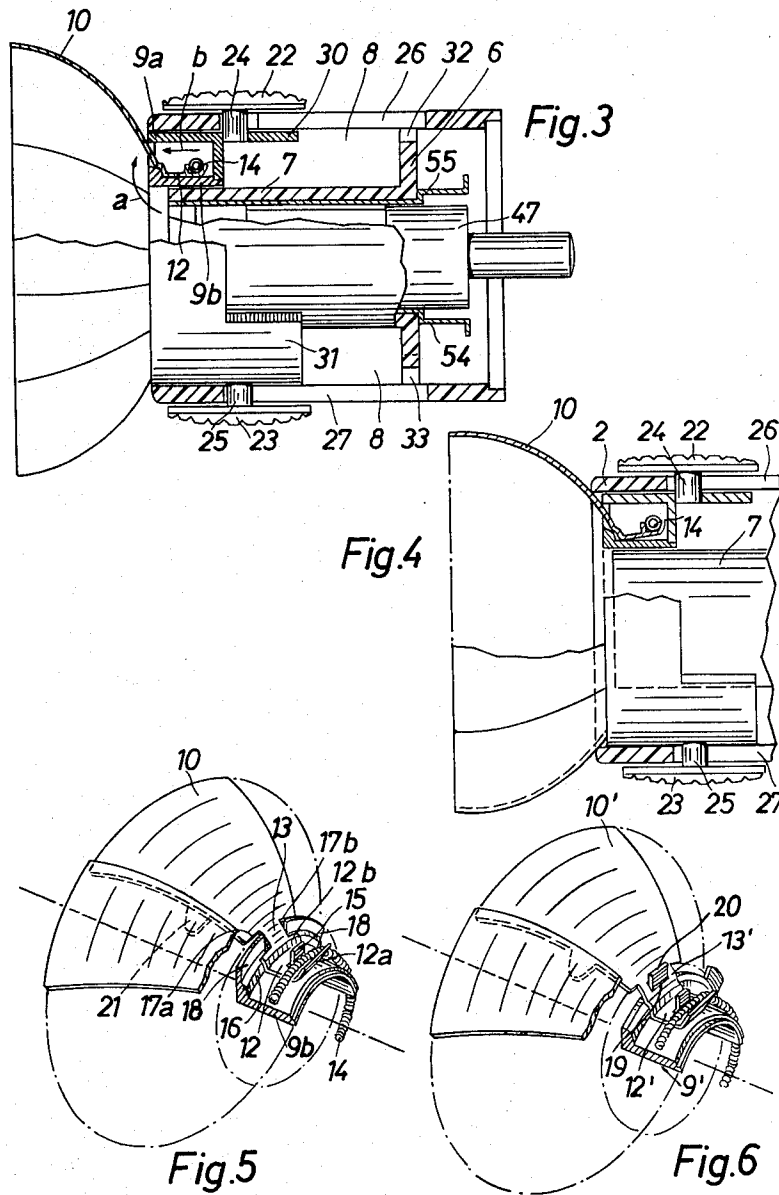
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Fig. 7

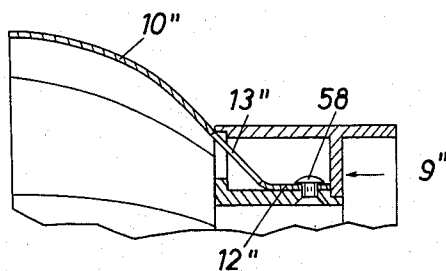
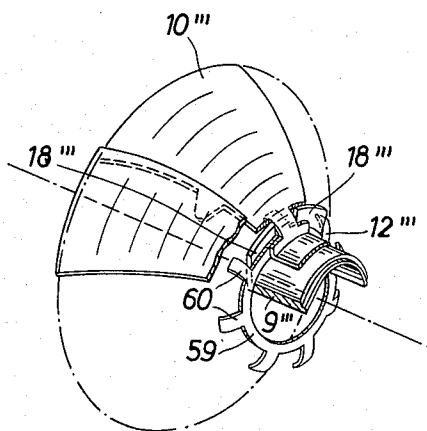


Fig. 8



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3,207,890

FLASH-LAMP ASSEMBLY FOR CAMERAS
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Claims priority, application Germany, July 20, 1961,
F 20,573; July 21, 1961, F 34,483
18 Claims. (Cl. 240—1.3)

The present invention relates to flash-lamp assemblies particularly of the type which include a plurality of reflector sections capable of being collapsed and expanded.

There are known flash-lamp assemblies which include reflectors made up of a plurality of reflector sections which are circumferentially moved in order to collapse or expand the reflector, and with structures of this type the assembled reflector sections usually remain exposed unless the reflector is provided with a special cover which must be mounted on or removed from the assembly by the operator, so that either the reflector sections remain undesirably exposed or it is necessary, to provide a special cover which the operator must carry about and must mount on or remove from the assembly. While there are springy, one-piece reflectors which can be moved into or out of a housing, such reflectors have very poor reflecting properties and do not provide the best lighting conditions.

It is accordingly a primary object of the present invention to provide a flash-lamp assembly with a plurality of reflector sections which will be automatically covered in the collapsed position of the reflector and which do not require any operations such as circumferential turning of the reflector sections between collapsed and expanded conditions or the carrying about and manipulation of special covering structure.

A further object of the present is to provide a flash-lamp assembly with a structure which enables the reflector sections to be easily and quickly moved between closed and open positions while being automatically covered in their closed position.

It is furthermore an object of the present invention to provide a structure of the above type which enables the operator to select the positions, of the reflector sections with respect to the reflector axis for varying the degree with which the beam of light reflected by the reflector is concentrated.

It is also an object of the present invention to provide reflector sections which cooperate with each other in such a way that they remain in overlapping relation while properly guiding each other between their closed and open positions.

Another object of the present invention is to provide a structure which will reliably and efficiently guide moving parts of the flash-lamp assembly.

Still another object of the present invention is to provide a flash-lamp assembly of the above type with a structure which will releasably retain the reflector sections in their open position.

Yet another object of the present invention is to provide a flash-lamp assembly of the above type which is of an extremely simple construction while at the same time being convenient to handle and operate and providing an extremely good illumination.

Furthermore, the object of the invention include the provision of a flash-lamp assembly which is extremely compact so that it will not occupy a large amount of space and which at the same time has individual components which are inexpensive to manufacture.

A still further object of the present invention is to provide a flash-lamp assembly of the above type which renders it extremely simple and convenient to change

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one battery for another and which also positions the various electrical components of the flash-lamp assembly in a manner making the best possible use of the available space.

Among the objects of the present invention is also the provision of a flash-lamp assembly of the above type which when it is not connected to a camera and thus is not in use can be placed in a position where the entire assembly is easily transported about without any inconvenience resulting, for example, from an electrical cable projecting from the assembly.

With the above objects in view the invention includes, in a flash-lamp assembly, a reflector means which has a reflector axis and includes a plurality of reflector sections distributed about this axis. An annular carrier means carries the reflector sections and amounts them for movement toward the reflector axis to a closed position and away from the reflector axis to an open position, the carrier means also cooperating with the reflector sections to prevent circumferential movement thereof with respect to the reflector axis. An elongated tubular member extends through the annular carrier means to support it for shifting movement along the reflector axis, so that this tubular member forms a support means for the carrier means, and the elongated tubular member in addition acts as a lamp receptacle. This elongated tubular support means forms part of a housing of the flash-lamp assembly, and this housing has a portion adapted to accommodate a battery in a position extending parallel to the reflector axis as well as an additional tubular portion surrounding the annular carrier means and participating in guiding the longitudinal shifting movement thereof, a resilient yieldable means cooperating with the reflector sections during movement of the carrier means along the reflector axis for moving the reflector sections away from the reflector axis to their open positions.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 shows in a perspective view a housing of a flash-lamp assembly according to the invention with the structure carried by this housing, part of the housing being broken away to more clearly illustrate the structure carried by the housing and the rear cover of the housing being shown in FIG. 1 separated from the rest of the housing to illustrate more clearly the structure of the invention;

FIG. 2 is a longitudinal sectional view of the flash-lamp assembly of the invention, the assembly being shown in FIG. 2 where the reflector is in its collapsed position and FIG. 2 being taken along line II—II of FIG. 1 in the direction of the arrows;

FIG. 3 is a sectional plan view taken along line III—III of FIG. 1 in the direction of the arrows and showing in particular that part of the structure where the reflector is located and where there is located the structure which cooperates with the reflector;

FIG. 4 shows the reflector of FIG. 3 in an open position different from that of FIG. 3;

FIG. 5 is a fragmentary partly sectional perspective illustration of the reflector structure and in particular FIG. 5 shows the structure for moving the reflector sections to their open position and for maintaining the circumferential relationship between the reflector sections;

FIG. 6 is a perspective view showing another embodiment of the structure of FIG. 5;

FIG. 7 is a fragmentary longitudinal sectional illustration of yet another embodiment of a reflector with a structure for carrying the same; and

FIG. 8 shows a still further embodiment of a structure for moving the reflector sections to their open position.

Referring to FIGS. 1 and 2, the housing 1 of the flash-lamp assembly of the invention is molded, for example, from a plastic, electrically non-conductive material and includes an outer tubular portion 2 which forms a guide as will be apparent from the description below. This outer tubular portion 2 of the housing 1 merges with the wall portions 3 thereof, and these wall portions 3 form an additional housing portion which defines the chamber 4 which is adapted to receive the elongated battery 5 in the form of a conventional dry cell battery of the type used in flashlights. The housing 1 includes in addition to the outer tubular portion 2 and the walls 3 a transverse wall portion 6 which serves to connect coaxially to the outer tubular portion 2 in the interior thereof an inner tubular housing portion 7 which forms a lamp receptacle and which also forms a support means as described below. The inner tubular portion 7 and the outer tubular portion 2 of the housing 1 define an elongated annular chamber 8, and it will be noted that the axis A—A of the battery 5 is parallel to the axis B—B of the elongated hollow annular chamber 8.

An annular carrier means is axially shiftable in the elongated chamber 8, and this carrier means 9 is of substantially U-shaped cross-section and is formed from a pair of ring-shaped angle members. The carrier means 9 carries a reflector means whose axis coincides with the axis B—B, and this reflector means includes a plurality of substantially rigid, curved reflector sections 10 which are distributed about the reflector axis and which cooperate to form the reflector. As is apparent from FIG. 2, each reflector section 10 has a free rear end portion 12 extending at a given angle with respect to the remainder of the reflector section and extending into the hollow space 11 defined by the portions 9a and 9b which form the carrier means 9, these end portions 12 of the reflector sections directly engaging and being carried by the carrier means 9. In addition, the carrier means 9 mounts the reflector sections 10 for turning movement toward the reflector axis to a closed position illustrated in FIG. 2 and away from the reflector axis to an open position illustrated, for example, in FIG. 3. Each reflector section 10 has an intermediate portion 13 located between its rear end portion 12 and the remainder of the reflector section. An endless coil spring 14 surrounds and engages the rear end portions 12 of the reflector sections to urge these portions 12 against the inner peripheral wall of the carrier means 9 and thus urge the reflector sections 10 away from the reflector axis to their open position, so that the spring 14 forms a means for yieldably and resiliently retaining the reflector sections in their open position. As is apparent particularly from FIG. 5, the free rear end portions 12 of the reflector sections 10 terminate in outwardly directed tongues 12a while forwardly of these tongues 12a the reflector sections 10 are respectively provided with outwardly directed lugs 15, and the spring 14 extends between the lugs 15 and the tongues 12a of the reflector sections. The tongues 12a are integral with the reflector sections and the lugs 15 may be struck from the reflector sections themselves. Thus, the spring 14 acts to urge the reflector sections 10 to turn in the direction of the arrow *a* of FIG. 3 away from the reflector axis to the open position of the reflector. In order to prevent the reflector sections 10 from shifting in the direction of the arrow *b* of FIG. 3 out of the hollow interior 11 of the carrier means 9, the lower portion 9b of the carrier means 9 terminates at its front edge in an outwardly directed flange 16 (FIG. 2), and this flange 16 engages the edge portions 12b (FIG. 5)

at the junction between the end portions 12 and the remainder of the reflector sections so that in this way movement of the several reflector sections in the direction of the arrow *b* of FIG. 3 relative to the carrier means 9 is limited.

The carrier means 9 also cooperates with the several reflector sections 10 to prevent circumferential movement thereof about the axis of the reflector means which is formed by the reflector sections 10, and for this purpose the carrier means 9 is provided at the front end of its portion 9b with outwardly directed projections extending into cutouts formed in the several reflector sections 10. Thus, according to the embodiment illustrated in FIG. 5 each reflector section 10 is formed with a pair of opposed notches 17a and 17b extending inwardly from its opposite side edge and between which the intermediate portion 13 of each reflector section 10 is located, and each projection 18 at the front end of the portion 9b of the carrier means 9 extends through the pair of adjoining notches 17a, 17b of a pair of adjoining reflector sections 10, so that in this way the portions 13 of the reflector sections are guided for movement between the projections 18 enabling the reflector sections to turn toward and away from the reflector axis while at the same time the projections 18 prevent circumferential movement of the reflector sections 10. According to the embodiment shown in FIG. 6, however, each intermediate portion 13' of the reflector sections 10' is formed with an opening 19 which forms a cutout receiving a projection 20 of the carrier means 9', so that in this way while the rear end portions 12' engage the carrier means 9' to provide a mounting of the reflector sections 10' for turning movement toward and away from the reflector axis, at the same time the projections 20 extend through the openings 19 of the reflector sections 10', respectively, in order to limit and prevent circumferential movement of the several reflector sections 10'.

Moreover, as is indicated in FIG. 5, each reflector section 10 is provided at one side with a projecting portion 21 slidably engaging the inner reflecting face of the neighboring reflector section 10, so that these portions 21 of the several reflector sections 10 maintain these reflector sections in overlapping relationship with respect to each other during all of their movements toward and away from the reflector axis.

The carrier means 9 is shiftable along the axis of the reflector means for bringing about the movement of the reflector sections 10 between their closed and open positions, and for this purpose a pair of manually-engageable members 22 and 23 (FIG. 3) are available to the operator. These manually-engageable members 22 and 23 are respectively fixedly carried by a pair of pins 24 and 25 which respectively extend through a pair of elongated slots 26 and 27 formed in the tubular portion 2 of the housing 1, and these slots 26 and 27 extend parallel to the axis of the reflector. The tubular portion 2 of the housing 1 terminates at its front end in an opening 28 through which the reflector sections 10 pass, and adjacent to the ends of the slots 26 and 27 which are nearest to the open end 28 of the tubular portion 2, which is to say the front ends of the slots 26 and 27, these slots are respectively formed with a pair of circumferential notches 29, the circumferential notch 29 of the slot 27 extending from the upper edge of the slot 27 as viewed in FIG. 1, while the circumferential notch 29 of the slot 26 extends downwardly from its lower edge. These notches 29 are positioned at the same location relative to the axis of the reflector means, and the same is true of the pins 24 and 25. Thus, these pins 24 and 25 can be moved either all the way to the front ends of the slots 26 and 27 or they may be moved to a position slightly to the rear of the front ends of the slots 26 and 27, and in this latter position the pins 24 and 25 together with the members 22 and 23 as well as the carrier means

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9 can be turned through a small angle so that the pins 24 and 25 will be received in the notches 29, and these notches 29 will now serve to retain the carrier means 9 in the position of FIG. 4 where it is slightly to the rear of the position indicated in FIG. 3.

In order to guide the carrier means 9 smoothly along the axis of the reflector means without any possibility of angular tilting of the carrier means 9 with respect to the axis of the reflector means, the carrier means 9 is provided with a pair of integral rearwardly extending portions 30 and 31 which respectively form parts of a cylinder which coincides with the inner surface of the tubular portion 2 of the housing 1, so that in this way the extensions 30 and 31 increase the area of slidable engagement between the carrier means 9 and the tubular portion 2 of the housing 1 and thus provide an effective guide for the carrier means 9 during longitudinal movement thereof along the axis of the reflector means. In order to reduce the length of the entire assembly the transverse wall 6 which interconnects the inner and outer tubular portions 7 and 2 of the housing 1 is formed with a pair of arcuate slots 32 and 33 the outer edges of which coincide with the inner surface of the tubular portion 2 of the housing 1, and the width of the slots 32 and 33 corresponds to the thickness of the portions 30 and 31 of the guide means 9 as well as to the angular length thereof so that these extensions 30 and 31 can move freely through the slots 32 and 33, respectively, and thus in the inner or rear position of the carrier means 9 shown in FIG. 2 the extensions 30 and 31 will extend through the wall 6 so as to decrease in this way the length of the assembly between its front and rear sides. The extensions 30 and 31 will move through the slots 32 and 33, respectively, during rearward movement of the carrier means 9 along the tubular support means 7, this rearward movement of the carrier means 9 bringing about the movement of the reflector sections 10 to their closed position indicated in FIG. 2 where the reflector sections 10 are housed within the housing 1.

As was indicated above, the open end 28 of the tubular portion 2 of the housing 1 is located at the front of the housing 1. At the rear of the housing 1 is located a rear cover 34 which is removably connected to the remainder of the housing 1. This rear cover 34 is formed by a pair of parallel wall means 35 and 36. The wall means 35 is provided with an integral endless lip 37 which surrounds and engages an integral endless lip 38 of the wall means 36, so that in this way there is defined by the pair of wall means a chamber 39 which is closed at its outer periphery by the cooperation of the lips 37 and 38, as is shown most clearly in FIG. 2. Moreover, these lips, and the lip 37 in particular, define with the outer peripheries of the pair of wall means 35 and 36 an endless gap 40. The hollow chamber 39 between the pair of wall means 35 and 36 serves to accommodate a springy electrical contact member 41 which extends through slots in the wall means 36 to the front side thereof, as is apparent from FIGS. 1 and 2, while the endless gap 40 serves to receive the coiled cable 42 which may be coiled into the gap 40 when the flash-lamp assembly is not in use, and the cable 42 terminates in a plug 43.

An elongated fastener member 44, in the form of an elongated hollow tube, is supported for free rotation by the cover 34, and it will be noted that the wall means 36 is formed with an opening through which the fastener member 44 passes, and the wall means 35 is also formed with an opening through which the fastener member 44 passes, this fastener member having an outer flange engaging the rear surface of the wall means 36, as shown in FIG. 2. The fastener member 44 is provided at its inner or front end portion with an outer thread 45. A tubular nut member 47 is fixedly carried by the tubular portion 7 of the housing 1 at the rear end portion of the tubular portion 7, coaxially therewith, and the tubular nut mem-

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ber 47 is provided with an inner thread 46 mating with and threadedly receiving the outer thread 45 of the fastener member 44, so that this fastener member can be threaded into the tubular nut member 47 for releasably fixing the cover 34 on the housing 1. These tubular members 44 and 47 also function as a guide and support for an elongated ejector rod 48 forming an ejecting means for ejecting from the flash-lamp assembly a lamp which has already been ignited and burnt out. Thus, the ejector rod 48 forms an ejector means whose axis coincides with the axis of the reflector means, and it will be noted from FIG. 2 that a spring is within the tubular portion 7 surrounding the ejector rod 48 and engaging a member fixed to the front end thereof for urging the rod 48 forwardly to the illustrated position where a shoulder of the rod 48 engages the front wall of the tubular nut member 47. When the lamp is introduced into the front end of the tubular portion 7 of the housing 1 the rod 48 is moved rearwardly in opposition to the spring which urges the latter forwardly, and when it is desired to eject the lamp the operator simply pushes the rod 48 forwardly to the illustrated position. A computer disc 49 coaxially surrounds the tubular fastener member 44, this disc 49 having an inner lip at its front face which extends partly around the edge of the opening of the wall means 35 through which the fastener member 44 passes, so that in this way the computer disc 49 is prevented from moving axially with respect to the wall means 35 so as to remain connected thereto while at the same time being freely turnable on the wall means 35. The wall means 35 carries at its rear exposed surface a stationary disc 50 carrying a scale which cooperates with the computer disc 49 in a manner well known in the art to enable the operator to determine the aperture at which the diaphragm of the camera should be set when making a photograph with flash exposure.

It will be noted that there is defined within the housing 1 between the transverse wall 6 and the cover 34 thereof, above the chamber 4 which receives the battery 5 an additional hollow chamber 51, and within the hollow chamber 51 is mounted the elongated condenser 52 which extends transversely with respect to the axis A—A of the battery 5. The condenser 52 is thus located in a space within the housing 1 which is in any event free so that with this construction the best possible use is made of the available space. As is apparent from FIG. 1, one end of the condenser 52 is connected by a conductor 53 with the rear end of an elongated springy electrically conductive member 54 which extends longitudinally through the tubular portion 7 of the housing along the inner surface of the tubular portion 7. The other end of the condenser 52 is electrically connected through an unillustrated resistance with the negative pole of the battery 5. The battery 5 is electrically connected through the springy electrically conductive contact member 41 with the second elongated electrically conductive springy member 55 which extends along the interior of the tubular portion 7 at a part thereof diametrically opposed to the springy member 54, as is apparent from FIG. 3, and it will be noted from FIG. 1 that the upper free end of the springy member 41 located at the front of the cover 34 is laterally offset with respect to its lower end which engages the positive pole of the battery 5, so that this upper free end of the member 41 shown in FIG. 1 can engage the rear end of the member 55 shown in FIG. 3. The pair of springy members 54 and 55 serve at their front ends to releasably retain a lamp within the front end portion of the tubular part 7 of the housing 1, so that this member 7 serves also as a lamp receptacle, as was pointed out above. In addition the pair of electrical conductors of the cable 42 are respectively connected with the electrically conductive member 55 and with the end of the condenser 52 which is connected to the resistance.

The housing 1 fixedly carries at its underside a foot member 56 of substantially T-shaped cross section

adapted to be slidably received within a shoe which is carried by the camera, in a manner well known in the art, and this foot member 56 is formed with a cutout 57 arranged substantially centrally of the foot member 56 and having a configuration mating with that of the plug 43 at the end of the cable 42 so that this plug 43 can be received within the cutout 57 as is shown in dot-dash lines in FIG. 2, the lower wall of the housing 1 also being formed with an opening through which part of the plug 43 passes, as indicated in FIG. 2, so that in this way when the flash-lamp assembly of the invention is not connected to the camera and is to be carried about the cable 42 may be coiled within the gap 40 and the plug 43 can be accommodated in the cutout 57 so that there are no portions of the cable extending from the flash-lamp assembly at this time and the flash-lamp assembly is therefore capable of being carried about in an extremely convenient manner. As is apparent from FIG. 1 the cable 42 passes through an opening formed in an upper portion of the wall means 36 located beyond the lip 37 of the wall means 35.

In order to place the flash-lamp assembly of the invention in a condition where it will be ready to make an exposure, the assembly being shown in its inoperative position in FIGS. 1 and 2, with the reflector means closed, the cable 42 is unwound after the plug 43 has been removed from the cutout 57. Then the operator engages members 22 and 23 and shifts them forwardly so that the carrier means 9 is moved in a direction of the arrow *b* of FIG. 3. During this movement the several reflector sections 10 slide along the inner surface of the tubular portion 2 of the housing 1. When the carrier means 9 has been shifted forwardly through a sufficient distance, the spring 14 is capable of contracting and thus turning the reflector sections 10 away from the axis of the reflector means toward their open position, and this action will continue during the rest of the forward movement of the carrier means 9, this forward movement being limited by engagement of the pins 24 and 25 with the front ends of the slots 26 and 27, as pointed out above. In this way the reflector sections 10 will be automatically moved from the closed position of FIG. 2 to the open position of FIG. 3, and of course during the return movement of the carrier means 9 from the position of FIG. 3 to that of FIG. 2 the tubular portion 2 will cooperate with the reflector sections 10 for automatically moving them in opposition to the spring means 14 back toward the axis of the reflector means to their closed position indicated in FIG. 2.

In the event that the exposure is to be made with an objective of normal or shorter-than-normal focal length, the carrier means 9 is moved to its forwardmost position indicated in FIG. 3 where the pins 24 and 25 engage the front ends of the slots 26 and 27, and in this position the reflector sections 10 engage the front edge of the portion 9a of the carrier means 9, as indicated in FIG. 3. However, the structure can be so designed that in the end position of the reflector sections 10 shown in FIG. 3 these sections engage the outwardly directed flange at the front end of the inner portion 9b of the carrier means 9 in order to limit the movement of the reflector sections toward their open position.

In the case, however, where the exposure is to be made with an objective of longer-than-normal focal length, normal focal length of an objective being on the order of 50 mm., then the manually-engageable members 22 and 23 are moved forwardly only through a distance sufficient to locate the pins 24 and 25 in alignment with the circumferential notches 29, and then the members 22 and 23 are turned slightly so as to locate the pins in these notches, as described above, and the parts are shown in this position in FIG. 4. It will be noted that in this position the reflector sections 10 engage the front edge of the tubular portion 2 which defines the opening 28, and as a result they are now in an open position

where they are located nearer to the reflector axis than in the case of FIG. 3, so that as a result the light beam cannot spread to the extent that it can with the open position of FIG. 3, and thus with the position shown in FIG. 4 a more concentrated light beam will be provided by the reflector means, such a concentrated light beam being more suitable for exposures made with an objective of a relatively long focal length.

Of course, as is well known in the art, the lamp carried by the tubular portion 7 will be ignited when the shutter of the camera is actuated in order to make an exposure.

After the exposure has been made the lamp is ejected by the ejector means 48, and then the elements 22 and 23 are returned by the operator to their rear position where the pins 24 and 25 are located adjacent the rear ends of the slots 26 and 27, respectively, and the parts are shown in this position in FIG. 2. It will be noted that during the return movement of the carrier means 9 to the position of FIG. 2 it is completely unnecessary for the operator to manipulate any elements for the purpose of covering the reflector sections 10, and the tubular portion 2 cooperates with these reflector sections 10 to turn them in opposition to the spring means 14 back toward the axis of the reflector means to the closed position indicated in FIG. 2.

In order to change the battery 5 it is only necessary for the operator to unscrew the fastening element 44 so as to separate it from the tubular nut member 47, and now the entire cover 34 can be removed from the housing, this cover 34 being shown in this position in FIG. 1. Inasmuch as the contact 41 for the battery 5 is carried by the cover 34, when this cover 34 is removed it is an extremely simple matter to remove the battery 5 from the housing 1 and to replace it with another battery.

According to the reflector embodiment illustrated in FIG. 7 the reflector sections 10'' are made of a springy material such as spring steel, for example, and their rear end portions 12'' are fixed to the inner part of the carrier means 9'' by rivets 58, so that in the embodiment of FIG. 7 the rivets 58 form a means for yieldably retaining the reflector sections 10'' in their open position. The end portions 12'' extend at an angle with respect to the remainder of the reflector sections 10'', as indicated in FIG. 7, and the intermediate portions 13'' of this embodiment can have either the structure shown in FIG. 5 or the structure shown in FIG. 6. With this construction the inherent resiliency of the reflector sections urges them to their open position, and they are turned to their closed position in opposition to their inherent resiliency by the tubular portion 2, as described above. If desired, with the embodiment of FIG. 7 only the portions 13'' need be made of a springy material since in this case even if the remainder of each reflector section is relatively rigid the inherent resiliency of the portions 13'' will serve to urge the reflector sections to their open position.

A further possibility of a reflector construction is illustrated in FIG. 8 where reflector sections 10''' substantially similar to the reflector sections 10 of FIG. 5 are provided. It will be noted, however, that the spring means 14 and the portions 15 and 12a of the reflector sections of FIG. 5 are not included in FIG. 8. With the embodiment of FIG. 8 there is located between the rear free end portion 12''' of the reflector sections 10''' and the projections 18''', which correspond to the projections 18 of FIG. 5, a ring 59 made of a springy material and having at its outer periphery a plurality of springy projections 60 which are bent forwardly in the manner indicated in FIG. 8. These springy projections 60 engage the inner surfaces of the several reflector sections 10''', respectively, and urge the reflector sections 10''' to their open position in which they are shown in FIG. 8. During movement of the carrier means 9''' of FIG. 8 to its inner closed position the tubular portion 2 of the housing 1 also cooperates with the reflector sections 10''' to turn them toward the axis of the reflector means to their closed

position, and during this time the reflector sections 10'' are turned in opposition to the force of the springy projections 60 which bend inwardly as they yield in order to permit the reflector sections 10'' to turn to their closed position. However, as soon as the carrier means 9'' is shifted forwardly in the manner described above the springy projections 60 will act to open the reflector means.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of flash-lamp assemblies differing from the types described above.

While the invention has been illustrated and described as embodied in flash-lamp assemblies with reflectors, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; carrier means carrying said reflector sections and mounting them for turning movement between an inoperative closed position turned toward and an operative open position turned away from said axis; support means supporting said carrier means for shifting movement along said axis between a first inoperative and a second operative position, said support means including a tubular lamp receptacle and a housing part of which coaxially surrounds said tubular lamp receptacle and forms therewith an elongated annular chamber in which said carrier means is slidable; opening means for turning said reflector section automatically from said inoperative closed into said operative open position thereof when said carrier means carrying said reflector sections is shifted together with said reflector sections into said second operative position thereof; and closing means turning said reflector sections automatically from said operative open into said inoperative closed position thereof when said carrier means carrying said reflector sections is shifted together with said reflector sections into said first inoperative position thereof.

2. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of separate reflector sections distributed about said axis; carrier means carrying said reflector sections and mounting them for turning movement between an inoperative closed position turned toward and an operative open position turned away from said axis, said carrier means having a substantially U-shaped cross section and each separate reflector section having a free end portion extending at a given angle with respect to the remainder of each reflector section and located within said carrier means; support means supporting said carrier means for shifting movement along said axis between a first inoperative and a second operative position; opening means for turning said reflector section automatically from said inoperative closed into said operative open position thereof when said carrier means carrying said reflector sections is shifted together with said reflector sections into said second operative position thereof; and closing means surrounding said reflector sections and engaging the same for turning said reflector sections automatically from said operative open into said inoperative closed position thereof when said carrier means carrying said reflector sec-

tions is shifted together with said reflector sections into said first inoperative position thereof.

3. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at a given angle with respect to the remainder of the reflector section; carrier means carrying said reflector sections and supporting them at their free end portions for respective turning movement toward said axis to a closed position and away from said axis to an open position; and an endless coil spring surrounding and engaging said free end portions of said reflector sections for urging the latter from said closed to said open position thereof.

4. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at a given angle with respect to the remainder of the reflector section, each reflector section being made of a springy material at least at the portion of each reflector section which is adjacent to its free end portion; and carriers means carrying said reflector sections and supporting them for turning movement toward said axis to a closed position and away from said axis to an open position, said free end portions of said reflector sections being respectively fixed to said carrier means and said springy portions of said reflector sections urging them to their open position so that said reflector sections are turned with respect to said carrier means to their closed positions in opposition to the inherent resiliency of said springy portions of said reflector sections.

5. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at a given angle with respect to the remainder of the reflector section; annular carrier means carrying said reflector sections and mounting them for respective turning movement toward said axis to a closed position and away from said axis to an open position, said free end portions of said reflector sections engaging said carrier means; and a ring surrounding and carried by said carrier means and respectively having springy tongues engaging said reflector sections and urging the latter to turn away from said axis to said open position, so that said reflector sections are turned toward said axis to said closed position in opposition to said springy tongues of said ring.

6. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at an angle with respect to the remainder of the reflector section; annular carrier means carrying said reflector sections at said free end portions thereof and mounting said reflector sections for turning movement toward said axis to a closed position and away from said axis to an open position, said carrier means being of an annular configuration and having a plurality of radial projections and said reflector sections being formed with cutouts into which said projections extend for preventing circumferential movement of said reflector sections with respect to said axis.

7. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at an angle with respect to the remainder of the reflector section; annular carrier means carrying said reflector sections at said free end portions thereof and mounting said reflector sections for turning movement toward said axis to a closed position and away from said axis to an open position, said carrier means being of an annular configuration and having a plurality of radial projections and said reflector sections being formed with cutouts into which said projections extend for preventing circumferential movement of

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said reflector sections with respect to said axis, said cutouts being in the form of notches in said reflector sections extending inwardly from a pair of opposed side edges of each reflector section and said projections extending into said notches.

8. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at an angle with respect to the remainder of the reflector section; annular carrier means carrying said reflector sections at said free end portions thereof and mounting said reflector sections for turning movement toward said axis to a closed position and away from said axis to an open position, said carrier means being of an annular configuration and having a plurality of radial projections and said reflector sections being formed with cutouts into which said projections extend for preventing circumferential movement of said reflector sections with respect to said axis, said cutouts being in the form of openings passing through said reflector sections, respectively, and said projections of said carrier means respectively extending through said openings.

9. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; annular carrier means extending around said axis and carrying said reflector sections, said carrier means mounting said reflector sections for turning movement toward said axis to an operative closed position and away from said axis to a plurality of operative open positions where said reflector sections are located respectively at different distances from said axis to provide different degrees of concentration of a beam of light reflected by said reflector means; support means supporting said carrier means for shifting movement along said axis between an inoperative first and a plurality of operative second positions; opening means for turning said reflector sections automatically from said inoperative closed into one of said operative open positions thereof when said carrier means is shifted together with said reflector sections into the corresponding one of said operative second positions thereof; and closing means turning said reflector sections automatically from said one operative open into said inoperative closed position thereof when said carrier means is shifted together with said reflector sections into said inoperative first position thereof, said closing means including means cooperating with said sections in response to shifting of said carrier means along said axis for determining the particular operative open position of said reflector sections so that in accordance with the position of said carrier means along said reflector axis said sections will be opened to a greater or lesser degree, said means for determining the extent of opening movement of said reflector sections being in the form of a housing which surrounds said support means and defines therewith an annular chamber in which said carrier means is slidable, said housing terminating in an edge which engages said reflector sections at their non-reflecting surfaces to limit the extent of opening movement thereof, and said carrier means itself having an edge portion engaging said reflector sections to provide therefor an operative open position different from that which is provided by said housing.

10. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; carrier means carrying said reflector sections and mounting them for movement toward said axis to a closed position and away from said axis to an open position, and each reflector section having a tab shaped lateral extension projecting beyond an edge thereof and slidably engaging the neighboring reflector section and sliding therealong during opening and closing movement of said sections for maintaining said sections in overlapping relationship with respect to each other during their closing and opening movement.

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11. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; annular carrier means extending around said axis and carrying said reflector sections, said carrier means mounting said sections for movement toward said axis to a closed position and away from said axis to an open position; elongated tubular support means adapted to receive a lamp and extending through and slidably supporting said carrier means for shifting movement along said axis; and a housing having a tubular portion surrounding said support means and defining therewith an elongated annular chamber in which said carrier means is shiftable along said axis, said tubular portion of said housing being connected to said support means by a transverse wall of said housing, and said transverse wall of said housing being formed with a pair of slots passing therethrough, said carrier means having a pair of elongated extensions slidably engaging said tubular portion of said housing for participating in the guiding of said carrier means and said extensions extending through said slots in at least one position of said carrier means so that the latter can be positioned close to said wall.

12. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; annular carrier means carrying said reflector sections and mounting them for movement toward said axis to a closed position and away from said axis to an open position; elongated support means extending through said annular carrier means and supporting the latter for axial shifting movement; a housing having a tubular portion coaxially surrounding said elongated support means and defining therewith an elongated annular chamber in which said carrier means is shiftable along said axis, said tubular portion of said housing being formed with at least one elongated slot extending parallel to said axis and with at least one notch extending circumferentially with respect to said axis from a side edge of said slot; a pin fixed to said carrier means and extending through said slot; and a manually-engageable member carried by said pin at the exterior of said tubular portion of said housing so that said manually-engageable member may be engaged by the operator for moving said pin along said slot so as to shift said carrier means along said reflector axis, said pin being receivable in said notch for maintaining said carrier means in a given position with respect to said axis where said reflector sections are in their open position.

13. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections about said axis; annular carrier means carrying said reflector sections and supporting them for turning movement toward said axis to an inoperative closed position and away from said axis to an operative open position; housing means having an inner tubular portion extending through said annular carrier means and slidably supporting the same for shifting movement along said axis between a first inoperative and a second operative position, said inner tubular portion of said housing being adapted to receive a lamp, said housing means also having an outer tubular portion surrounding said inner tubular portion and defining therewith an elongated annular chamber in which said carrier means is shiftable with respect to said reflector axis, and said housing means having an additional housing portion for accommodating a battery in a position where the axis of the battery extends parallel to the reflector axis; opening means for turning said reflector sections automatically from said inoperative closed into said operative open position thereof when said carrier means carrying said reflector sections is shifted together with said reflector sections into said second operative position thereof; and closing means turning said reflector sections automatically from said operative open into said inopera-

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tive closed position thereof when said carrier means carrying said reflector sections is shifted together with said reflector sections into said first inoperative position thereof.

14. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; annular carrier means carrying said reflector sections and supporting them for movement toward said axis to a closed position and away from said axis to an open position; housing means having an inner tubular portion extending through said annular carrier means and slidably supporting the same for shifting movement along said axis, said inner tubular portion of said housing being adapted to receive a lamp, said housing means also having an outer tubular portion surrounding said inner tubular portion and defining therewith an elongated annular chamber in which said carrier means is shiftable with respect to said reflector axis, and said housing means having an additional housing portion for accommodating a battery in a position where the axis of the battery extends parallel to but is offset from the reflector axis; elongated ejector means having an axis coinciding with said reflector axis and supported by said housing means for shifting movement along said axis for ejecting a lamp from said inner tubular portion of said housing; and means carried by said housing in the region in which said battery is accommodated for supporting a condenser in a position substantially adjacent said battery.

15. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis; annular carrier means carrying said reflector sections and supporting them for movement toward said axis to a closed position and away from said axis to an open position; and housing means having an inner tubular portion extending through said annular carrier means and slidably supporting the same shifting movement along said axis, said inner tubular portion of said housing being adapted to receive a lamp, said housing means also having an outer tubular portion surrounding said inner tubular portion and defining therewith an elongated annular chamber in which said carrier means is shiftable with respect to said reflector axis, and said housing means having an additional housing portion for accommodating an elongated battery in a position substantially coextending with said elongated annular chamber with the axis of the battery extending parallel to the reflector axis, said outer tubular portion of said housing terminating at a front side of said housing in a free edge defining an opening through which said reflector sections pass during axial movement of said carrier means, and said housing having a rear side and including a removable cover located at said rear side of said housing means.

16. In a flash-lamp assembly, in combination, a housing and a pair of wall means defining a rear cover for said housing, one of said pair of wall means being provided with a pair of spaced openings, said pair of wall means cooperating with each other to define inwardly of the outer peripheries of said pair of wall means an inner chamber which communicates with said openings and in which an elongated springy electrical contact is located and outwardly of said inner chamber between

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the latter and the outer peripheries of said pair of wall means an endless gap in which an electrical cable is adapted to be coiled, said elongated springy electrical contact being arranged to extend in said chamber from the one to the other of said pair of openings.

17. In a flash-lamp assembly, in combination, an inner tubular housing portion, an outer tubular housing portion coaxially surrounding said inner tubular housing portion, and a transverse wall interconnecting said inner and outer tubular housing portions, said wall being formed next to said outer tubular housing portion with a pair of diametrically opposed arcuate slots; annular carrier means located between said inner and outer tubular portions of said housing and shiftable therealong, said carrier means having a pair of extensions which engage said outer tubular portion for guiding said carrier means and which extend respectively through said slots in a rear position of said carrier means; and reflector means having an axis coinciding with the common axis of said tubular portions and including a plurality of reflector sections distributed about said axis of said reflector means and carried by said carrier means for movement toward said common axis to a closed position and away from said common axis to an open position.

18. In a flash-lamp assembly, in combination, reflector means having a reflector axis and including a plurality of reflector sections distributed about said axis and each having a free end portion extending at a given angle with respect to the remainder of the reflector section; carrier means carrying said reflector sections and supporting them at their free end portions for respective turning movement toward said axis to a closed position and away from said axis to an open position; and biasing means at said free end portions of said reflector sections for urging the latter from said closed to said open position thereof.

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