April 13, 1965 E. F. DEFFENBAUGH ETAL 3,178,567

MAGAZINE TYPE FLASHOLDER

Filed March 29, 1961 4 Sheets-Sheet 1

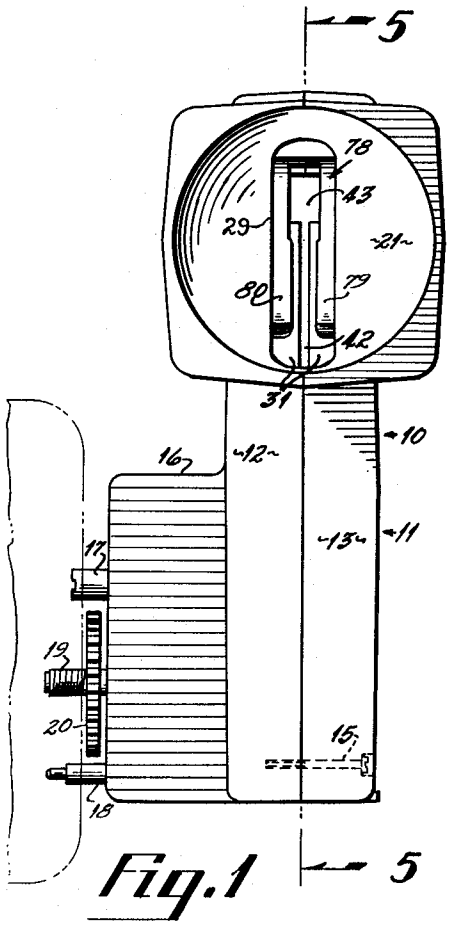



Fig. 1

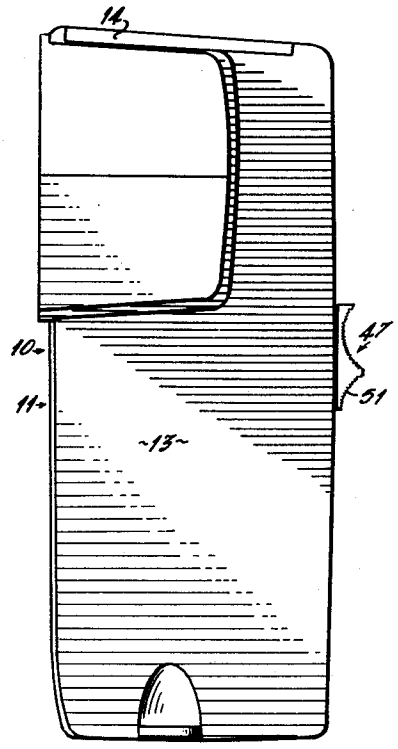



Fig. 2


Edmund F. Deffenbaugh
Charles E. Main
INVENTORS

BY R. Frank Smith
Armin B. Pagel

ATTORNEYS

April 13, 1965 E. F. DEFFENBAUGH ETAL 3,178,567

MAGAZINE TYPE FLASHOLDER

Filed March 29, 1961 4 Sheets-Sheet 2

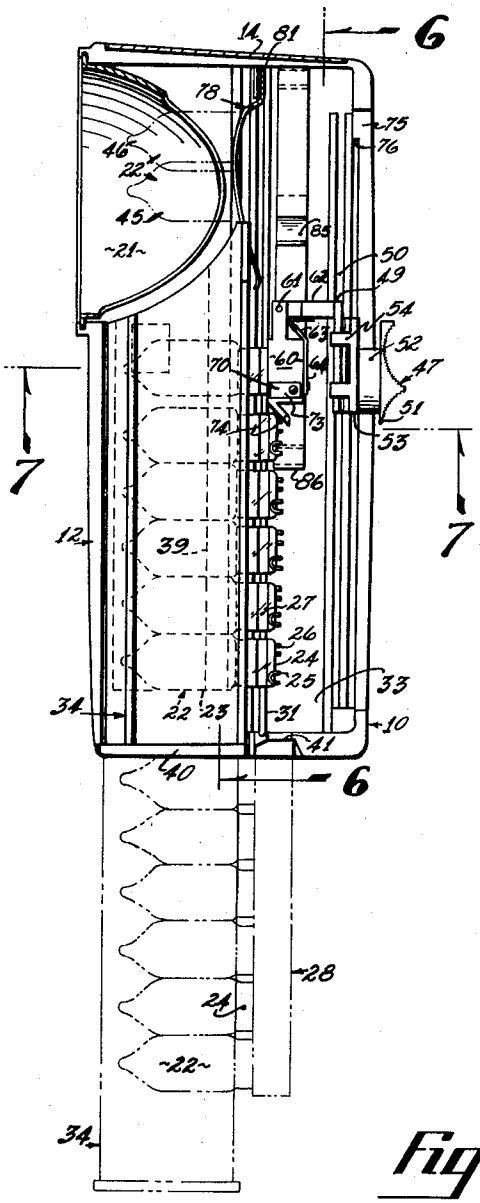


Fig. 5

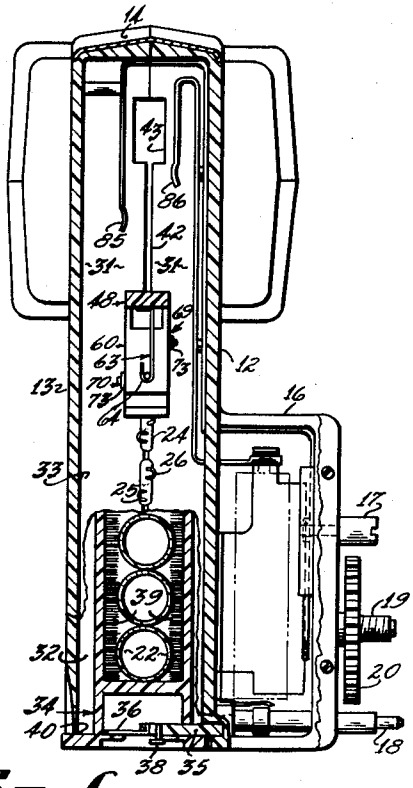


Fig. 6

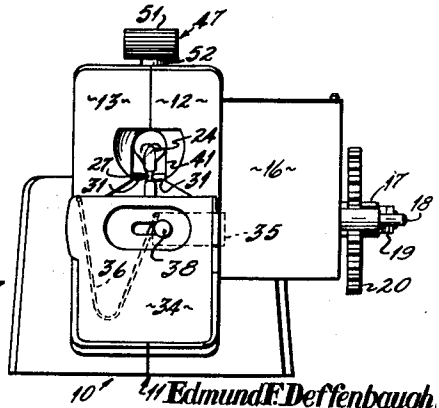


Fig. 3

Edmund F. Deffenbaugh
Charles E. Main
INVENTORS

BY R. Frank Smith
Armin B. Segel

ATTORNEYS

April 13, 1965 E. F. DEFFENBAUGH ETAL 3,178,567

MAGAZINE TYPE FLASHOLDER

Filed March 29, 1961 4 Sheets-Sheet 3

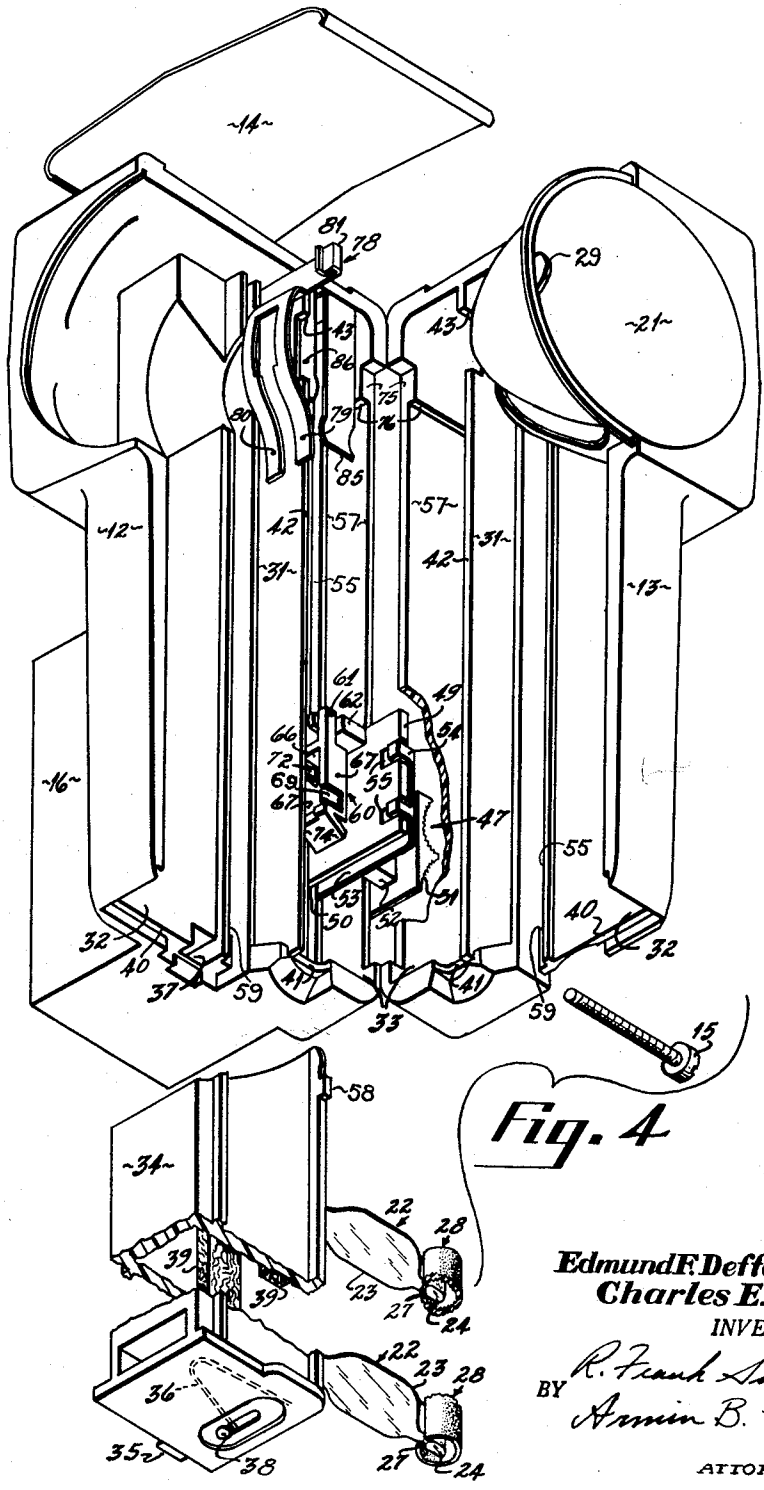



Fig. 4

Edmund F. Deffenbaugh
Charles E. Main
INVENTORS

BY R. Frank Smith
Armin B. Pagel

ATTORNEYS

April 13, 1965 E. F. DEFFENBAUGH ETAL 3,178,567

MAGAZINE TYPE FLASHOLDER

Filed March 29, 1961 4 Sheets-Sheet 4

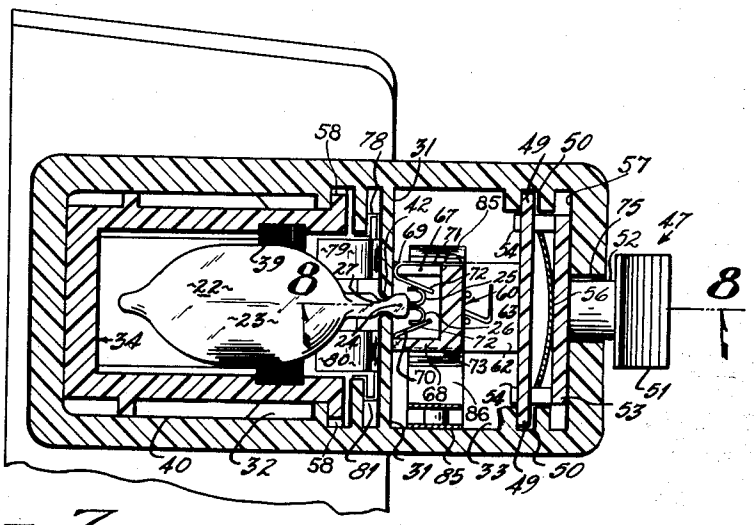


Fig. 7

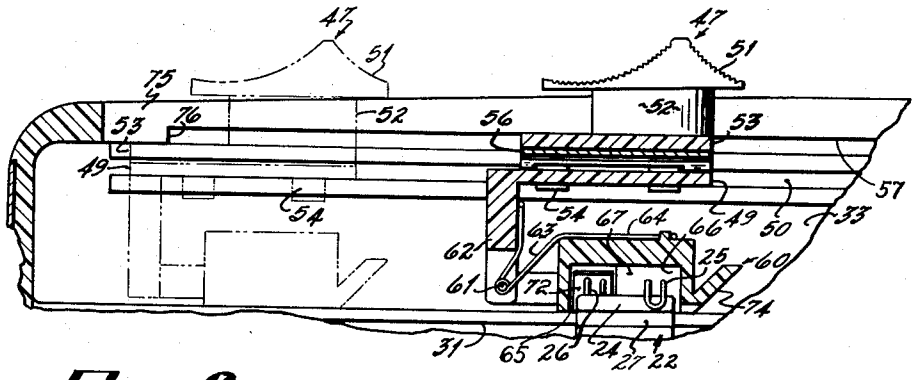


Fig. 8

Edmund F. Deffenbaugh
Charles E. Main
INVENTORS
BY R. Frank Smith
Armin B. Fagel
ATTORNEYS

United States Patent Office 3,178,567 Patented Apr. 13, 1965



3,178,567

# MAGAZINE TYPE FLASHOLDER

Edmund F. Deffenbaugh and Charles E. Main, Rochester, N.Y., assignors to Eastman Kodak Company, Rochester, N.Y., a corporation of New Jersey

Filed Mar. 29, 1961, Ser. No. 99,214
9 Claims. (Cl. 240—1.3)

The present invention relates to flashguns and more particularly to flashguns adapted to be loaded with a number of flash bulbs, and including means for quickly bringing such bulbs individually to firing position, firing the bulbs and ejecting each bulb after it has been fired.

While flashguns adapted to fire a number of flash bulbs in rapid sequence are well-known in the prior art, such devices adapted to use standard flash bulbs have generally been extremely complex, expensive, and/or bulky and have not been capable of convenient, dependable and rapid operation. While some of these shortcomings have been overcome in repeating flashguns adapted to use specially designed flash bulbs, such devices have never gained wide-spread popularity because of the non-availability of these special bulbs.

A primary object of the present invention is therefore to simplify the construction and mode of operation of a flashgun adapted to fire a number of flash bulbs in rapid sequence. Another object of the present invention is to provide such a flashgun adapted to utilize standard, commercially available flash bulbs. Still another object of the invention is to simplify the means whereby such a flashgun can be rapidly loaded with a plurality of flash bulbs in the clip-like package in which they are supplied by the manufacturer without the necessity of loading each bulb individually into the device. Yet another object of the invention is to simplify the construction and operation of such flashguns by employing a single operating member to transport a bulb from its storage position in the flashgun into a firing position, and thereafter to an ejecting position in which the bulb is discharged from the holder. Another object of the invention is to provide such an operating member with a bulb capturing means which receives only one bulb when the operating member is moved into bulb capturing position in the bulb storage portion of the flashgun. Yet another object of the invention is to provide such a flashgun with means for incorporating a flash bulb in the electrical circuit in the flashgun only when the bulb is located in firing position. Another object of the invention is to retain a bulb in firing position within the flashgun until the operating member is manually moved to bulb ejecting position, whereupon the ejection of the bulb from the flashgun is automatically effected. Still another object of the invention is to prevent accidental movement of the operating member beyond the bulb firing position into the bulb ejecting position. Another object of the invention is to provide such a flashgun with a drawer-like magazine adapted to receive such a clip of bulbs and to automatically remove the packing member from the bulbs as the magazine is inserted into the flashgun. These and other important objects of the invention will be more readily apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a front elevational view of a flashgun according to the preferred embodiment of the invention;

FIGURE 2 is a side elevational view thereof;

FIGURE 3 is a bottom plan view thereof;

FIGURE 4 is a disassembled perspective view of the flashgun showing the internal construction thereof;

FIGURE 5 is a cross-sectional view taken along lines 5—5 of FIGURE 1 with the loaded magazine in operating position;



FIGURE 6 is a cross-sectional view taken along the lines 6—6 of FIGURE 5;

FIGURE 7 is a cross-sectional view taken along the lines 7—7 of FIGURE 5; and

FIGURE 8 is a fragmentary cross sectional view taken along the lines 8—8 of FIGURE 7 with the flashgun in a downwardly facing position.

Referring now to FIGURE 1, a flashgun according to the preferred embodiment of the invention is indicated generally by the numeral **10**. The components of the flashgun are housed in a split body member **11** comprising two substantially allochiral casings **12** and **13** secured together at the top by a retainer clip **14** and at the bottom by a screw **15**. A compartment **16** is located adjacent casing **12** and houses the batteries used to discharge the flash bulbs as well as portions of the electric bulb firing circuit. A locating stud **17** and an electric terminal **18** project from the side of compartment **16** and cooperate with corresponding mating parts of a camera (shown in broken lines) to which the flashgun is adapted to be attached. The flashgun is secured to such a camera by a threaded terminal **19** which is screwed into a corresponding terminal of the camera by rotating knurled disk **20**. When the flashgun is thus attached to a camera, terminals **18** and **19** are in electrical connection with a conventional flash synchronizer switch built into the camera and cooperating with the camera shutter mechanism, not shown.

As is most clearly shown in FIGS. 3–8, the enlarged upper head portion of body member **11** houses a vertically slotted forwardly facing reflector **21**, while the lower bulb storage portion of the body member is adapted to receive a bulb magazine **34**. As illustrated in enlarged form in FIG. 7, a bulb of the type employed in the flashgun comprises an envelope **23** and a base **24** provided with opposed transverse supporting grooves **27** and with terminals **25** and **26** located near the end thereof. As supplied by the manufacturer six of such bulbs are supported in parallel side by side relation by a packing member **28** comprising a resilient plastic tube having a longitudinal slit in which the bases of the bulbs are resiliently gripped to form a clip as illustrated in FIGURE 4.

To load the flashgun, the drawer-like magazine **34** is withdrawn from body member as shown in FIG. 5 and is loaded with a clip as shown in the same figure, with the bases of the bulbs and the packing member **28** extending outside of the magazine and with the envelope portions of the bulbs loosely supported between resilient strips **39** which may be formed of plush or some other resilient material. While lugs **58** on the magazine and corresponding projections **59** on the body member normally prevent the complete removal of the magazine from the flashgun, the magazine may be completely removed, if desired, by springing the resilient magazine walls toward one another to allow lugs **58** to pass between projections **59**. With the loaded magazine in its withdrawn position as illustrated in FIG. 5, the transverse slots **27** in the bases of the bulbs are aligned with a bulb supporting slot **42** in partition **31** which separates the bulb storage portion of the flashgun into a magazine compartment **32** and a bulb base compartment **33**. Compartment **33** is closed at its lower end except for a bulb base receiving opening **41** aligned with the lower end of bulb supporting slot **42** and of sufficient size to allow the aligned bases of the bulbs to pass therethrough but of insufficient size to permit the passage of the packing member **28**. As the magazine is moved from the position shown in broken lines in FIGURE 5 into the magazine, the bulb bases pass through opening **41** with the transverse recesses therein moving into engagement with the edges of slot **42** as is most clearly shown in FIGURE 7. At the same time, the packing member **28** abuts against the closed end of the bulb base compartment surrounding opening **41** and is removed

from the bulbs as the bulbs are slid out of the packing member. Upon being fully inserted into the magazine compartment, the magazine is releasably retained within the flashgun by a latch 35 resiliently urged into a slot 37 in the casing 12 by a spring 36. A magazine release button 38 projecting from the latch and accessible from the lower end of the magazine permits the magazine to be released and withdrawn to its loading position. Thus supported in the flashgun, the bulbs are free to be moved vertically as viewed in FIGURES 4 through 6 against the slight frictional drag of resilient strips 39 but are retained in aligned relation by the engagement of the edges of slot 42 in partition 31 with the transverse supporting grooves 27 in the bases of the bulbs. As shown in FIGURES 4 and 6, slot 42 extends upwardly to a point aligned with the axis of the reflector so that the uppermost bulb in the magazine may be slid into its firing position at the center of the reflector while still being supported by the slot. In the area beyond the bulb firing position, however, the slot is widened as shown at 43 so that, when a bulb is slid past its firing position, the base thereof is no longer supported in the slot.

The mechanism employed to transfer the uppermost bulb in the magazine from the magazine to its firing and ejecting position (as shown at 45 in FIG. 5) is generally designated by numeral 47 and illustrated in FIGS. 4–8. This mechanism is slidably supported in the flashgun's body by movable support member 49, the lateral edges of which ride in grooves 50 in the body member. Support member 49 is operatively connected to a similar sliding member 53 by means of projections 54 on member 53 which engage corresponding slots 55 in member 49. A spring 56, located between members 49 and 53 resiliently urges member 49 against the rearwardly facing surfaces of slots 50 and member 53 against the rear wall 57 of compartment 33. In order to slide mechanism 47 within the flashgun body, a shank 52 attached to support member 49 extends through an elongated slot 75 in rear wall 57 and terminates in an externally accessible slide button 51.

As is most clearly illustrated in FIG. 8, the portion of mechanism 47 adapted to capture the uppermost bulb in the magazine to transport this bulb to its firing and ejecting positions comprises a bulb capturing member 60 hingedly attached by means of a pin 61 to supporting arm 62 of movable support member 49. Capturing member 60 is biased against the rearwardly directed surface of partition 31 astride bulb supporting slot 42 by means of a light spring 63, end 64 of which bears against the capturing member, and is provided with a forwardly facing recess 66 of sufficient size to accommodate the base portion of one bulb supported in slot 42 when the capturing member is in the position illustrated.

To capture the uppermost bulb in the magazine, the entire transport mechanism is slid downwardly (or toward the right as illustrated in FIG. 8). As the lower inclined surface 74 of the empty capturing member engages the base of the uppermost bulb in the magazine, the capturing member pivots about pin 61 and rides over the bulb base. When the mechanism has been moved to the lower limit of its stroke defined by the engagement of edge 65 of recess 66 with the base of the uppermost bulb, the recess is directly aligned with the bulb base even though the capturing member may still be pivoted out of capturing relation with the bulb base by the engagement of surface 74 with the base of the next lower bulb in the magazine. As soon as slide button 51 is moved toward the head of the flashgun, however, the capturing member moves out of engagement with the adjacent bulb and assumes the position shown in FIG. 8 in which the uppermost bulb in the magazine is securely captured. Thus captured, the bulb remains supported in slot 42 by its transverse base grooves but is movable sideways, completely independently of the other bulbs in the flashgun, between its storage position in the magazine and the bulb ejecting position shown at 46 in FIG. 5 by the bulb transport mechanism.

As the captured bulb is moved upwardly into the head portion of the flashgun, the envelope portion thereof passes through slot 29 in the reflector and into firing position coaxial therewith. In this position the bulb is still supported in slot 42 and is additionally stabilized by a bifurcated spring 78. This spring, as shown in FIGS. 4 and 7, is supported by housing engaging portions 81 behind reflector 21 with legs 79 and 80 thereof adjacent and astride slot 42, and is so formed as to engage the shoulder formed by the bulb envelope 23 and to be depressed by the bulb as it is moved upwardly into the head portion of the unit, thereby biasing the bulb in a forward direction and increasing its stability in its firing position. As will be explained more fully later in the specification, means associated with the bulb transport mechanism releasably limit the upward stroke of slide button to properly locate the bulb in firing position.

In order to electrically incorporate the captured bulb in the bulb firing circuit when the bulb is located in its firing position, side walls 67 and 68 of capturing member 60 are provided with U-shaped contact straps 69 and 70 as shown in FIGURE 7, the inner ends 72 of which are located within recess 66. As shown in FIGURE 7, the inner end of contact strap 69 engages terminal 25 of the captured lamp while the inner end of contact strap 70 engages terminal 26 thereof. When the capturing member has brought the bulb into firing position, ends 71 and 73 of contact straps 69 and 70 respectively, located externally of the side walls of the capturing member, are engaged by resilient conductor straps 85 and 86 as shown in FIGURE 6, which in turn are connected to the batteries located in housing 16 through the camera flash synchronizer switch. If, after having brought a fresh bulb into its firing position, the operator should desire to take a photograph without using the flashgun, the bulb need not be ejected from the flashgun but may simply be retracted out of electrical contact with the firing circuit by sliding button 51 downwardly, thereby moving the captured bulb back toward its storage position.

After the bulb has been fired, it is ejected from the flashgun by moving the transport mechanism and the captured bulb upwardly beyond the firing position into the position shown at 46 in FIGURE 5. As seen at 43 in FIGURE 6, slot 42 is enlarged beyond the position occupied by the bulb during firing, so that when moved into the position shown at 46, the transverse retaining recesses in the bulb base are no longer supported by slot 42. Thus, when the bulb is moved to this position, it is forceably ejected in a forward direction by spring 78.

In order to prevent the bulb from being accidentally moved past its firing position and into ejecting position, wall 57 of the camera body member adjacent the upper end of slot 75 is provided with a shoulder 76 which abuts against member 53 to locate the captured bulb in coaxial relation with the reflector. This construction is most clearly shown in FIG. 8. By simultaneously pressing slide button 51 in a forward direction as well as upwarly (or down and to the left as shown in FIG. 8), against the influence of spring 56, member 53 may be moved out of engagement with shoulder 76 thereby allowing the bulb transporting mechanism to bring the bulb past its firing position and into ejecting position, as shown in the broken line position. Inadvertently exerting both an upward and a forward thrust against the button as is required to eject a bulb, is effectively prevented by the shape of slide button 51, the rearwardly facing surfaces of which comprise two arcuate surfaces as illustrated. In moving the slide button from the bulb capturing position to the bulb firing position the operator normally presses against the lower arcuate surface with his thumb. Due to the shape of this surface and its location in alignment with the lower portion of member 53, it is practically impossible to move the upper edge of member 53 out of

engagement with shoulder **76** by exerting pressure against this surface. After the bulb has been fired, the operator, by pressing his thumb against the upper arcuate surface and simultaneously exerting a forward and upward thrust may readily disengage the upper edge of member **53** from shoulder **76** and slide the button beyond the firing position to the bulb ejecting position. From this position the push button is slid downwardly to capture the next bulb in the magazine to repeat the cycle.

To summarize the operation of the flashgun, the drawer-like magazine is withdrawn from the unit and a clip of flash bulbs is inserted into the magazine. As the magazine is returned to its operating position in the flashgun, the packing member of the clip is withdrawn from engagement with the bulbs and the bulbs are moved into supported relation in the unit. To move the first bulb into firing position slide button **51** is moved downwardly to the limit of its stroke and then is moved as far as possible in the opposite direction by pressing upwardly against the lower arcuate portion of the slide button. After the bulb has been fired, it is ejected from the flashgun by pressing forwardly and upwardly against the upper arcuate portion of the slide button. To then bring the next bulb into firing position the slide button is again moved downwardly to the end of its stroke and upwardly as before. After all of the bulbs in the magazine have been fired, the distinctly different feel and sound of the device as the push button is moved to its extreme lower position within the holder informs the operator that the magazine is empty.

Since it is obvious that various modifications of the invention are possible without departing from the spirit thereof, the present disclosure should be construed in an illustrative sense, the scope of the invention being defined by the following claims.

Having now particularly described our invention what we desire to secure by Letters Patent of the United States and what we claim is:

1. A flashgun comprising a hollow body portion having an opening in one wall; a head portion connected to one end of said body portion and including a reflector and means for supporting a flash bulb in a firing position with the bulb disposed substantially on, and extending axially of, the optical axis of said reflector; means in said body portion spaced from said head portion for supporting a plurality of individual flash bulbs in side-by-side stacked relation substantially parallel to the optical axis of said reflector and with the uppermost bulb in said stack normally spaced from said axis; and a bulb transporting means repirocally movable on said body portion to move between a position in which it engages the uppermost bulb in said stack and then moves said engaged bulb sideways into firing position in said head portion.

2. A flashgun according to claim 1, in which said means in said body portion for supporting a plurality of individual flash bulbs includes a bulb magazine slidable into and out of said body portion and into which a plurality of flash bulbs can be individually stacked in side-by-side relation when the magazine is withdrawn from said body portion to be so positioned in said body portion when the magazine is returned to said body portion.

3. A flashgun adapted to utilize flash bulbs each of which comprises an envelope and a base provided with bulb supporting means, said flashgun comprising: a hollow body portion having an opening in one wall thereof; a head portion fixed to one end of said body portion and including a reflector and means for supporting a bulb in firing position with the bulb disposed substantially on, and extending axially of, the optical axis of said reflector; an open ended magazine removably located in said body portion in spaced relation with said head portion and adapted to house a plurality of such flash bulbs in side-by-side stacked relation substantially parallel with the optical axis of said reflector and with the uppermost bulb in said stack normally spaced from said axis; guide means in said body portion for engaging the bulb supporting means of each of the bulbs in said magazine when said magazine is inserted into said body portion to slidably support said bases in said body portion in aligned relation; and a bulb transporting mechanism reciprocally movable on said body portion for engaging and moving said bulbs, one at a time, beginning with the uppermost bulb in said magazine, sideways along said guide means into firing position in said head portion.

4. A flashgun according to claim 3, including means in said head portion cooperating with said bulb transporting means for ejecting a bulb from said head portion.

5. A flashgun for use with flash bulbs supplied in a clip comprising a plurality of bulbs individually retained in parallel side-by-side relation by a removable clip engaging supporting means on the bases of said bulbs; said flashgun comprising: a hollow body portion open at one end; a magazine adapted to be loaded with such a clip of flash bulbs and removably inserted into the open end of said body portion; bulb supporting members in said body portion for slidably receiving the supporting means on the bases of said bulbs when a loaded magazine is inserted into said body portion; means for moving said bulbs out of said removable clip and into slidable supported relation with said bulb supporting members within said body portion as a loaded magazine is inserted into said open end of said body portion; a head portion connected to said body portion and including a reflector and means for receiving and supporting a flash bulb in firing position as it is moved from said body portion, and in which firing position the bulb is disposed substantially on, and extends axially of, the optical axis of said reflector; and a bulb transport mechanism reciprocally mounted on said body portion to move between a first position, in which it grasps the uppermost bulb in said magazine, and a second position, in which it transports said uppermost bulb to said firing position in the head portion.

6. A flashgun adapted to accommodate and fire in succession a plurality of flash bulbs each comprising an envelope and a base portion provided with bulb supporting means, said flashgun comprising: a bulb storage chamber; means associated with one end of said storage chamber for supporting a bulb in a firing position spaced from said chamber; bulb supporting members having spaced parallel edges extending from within said chamber to said bulb firing position to engage said bulb supporting means for slidably supporting a plurality of bulbs individually in stacked relation; means for moving said bulbs one at a time from said storage chamber into said firing position while said supporting means of the bulb being moved is slidably supported by said bulb supporting members, and including a bulb transport mechanism reciprocally mounted in said storage chamber to move between a first position, in which it captures the uppermost bulb in said chamber, and a second position, in which said captured bulb is moved into said firing position.

7. A flashgun adapted to utilize flash bulbs each of which comprises an envelope and a base provided with oppositely disposed transverse recesses; said flashgun comprising: a bulb storage chamber; means associated with one end of said chamber for supporting a bulb in a firing position spaced from said chamber; a pair of wall members having parallel spaced edges extending from within said chamber to said bulb firing position to slidably engage and support a plurality of bulbs individually in stacked relation in said chamber; manually operated means reciprocally mounted on said chamber to move between a first position, in which it captures the uppermost bulb stacked in said storage chamber, and a second position, in which it moves said captured bulb to said firing position while the same remains slidably supported by the spaced edges of said wall members; and means at

said firing position for electrically firing a bulb located in said firing position.

8. A flashgun adapted to utilize flash bulbs each of which comprises an envelope and a base provided with oppositely disposed transverse recesses; said flashgun comprising: a bulb storage chamber; means associated with one end of said chamber for supporting a bulb in a firing position spaced from said chamber and ejecting said lamp from said flashgun when it is moved beyond said firing position; a pair of wall members having parallel spaced edges extending from within said chamber to said bulb firing position to slidably engage and support a plurality of bulbs individually in stacked relation in said chamber; bulb transport means reciprocally mounted on said chamber to move between a first position, in which it captures the uppermost bulb stacked in said storage chamber, a second position, in which it moves said captured bulb to said firing position while the same remains slidably supported by the spaced edges of said wall member, and a third position, in which it moves said captured bulb from said firing position and out of engagement with the spaced edges of said wall member for ejection from said flashgun; stop means normally preventing movement of said transport means beyond said second position; and means for over-riding said stop means to intentionally move a bulb to said third position for ejection from said flashgun.

9. A flashgun comprising a housing; a reflector mounted on said housing; wall means defining a chamber in said housing for storing a plurality of flash bulbs in stacked side-by-side relation with the uppermost bulb in spaced relation with, and substantially parallel to, the optical axis of said reflector; a bulb transport mechanism reciprocally mounted on said housing to move from a first position, in which it engages the uppermost bulb in said chamber, to a second position, in which it slides said engaged bulb into a firing position in which the bulb is coaxial with said reflector, and a third position, in which it slides said engaged bulb beyond said firing position to an ejection position where it is ejected from said housing and finally back to said first position to engage the uppermost bulb in said chamber; abutment means engageable with said bulb transport mechanism to stop said transport mechanism in said second position when moving from said first position; and means for selectively disengaging said transport mechanism from said abutment means to permit movement thereof to said third position.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,672,039 | Schwartz et al. | Mar. 16, 1954 |
| 2,774,862 | Zwald | Dec. 18, 1956 |
| 2,835,787 | Mihalyi | May 20, 1958 |
| 2,892,073 | Michatek et al. | June 23, 1959 |
| 2,982,119 | Anderson | May 2, 1961 |
| 3,015,023 | Dayton et al. | Dec. 26, 1961 |