Oct. 3, 1961 D. N. BROOKS ET AL 3,003,053

FLASHGUN

Filed Dec. 30, 1959 3 Sheets-Sheet 1

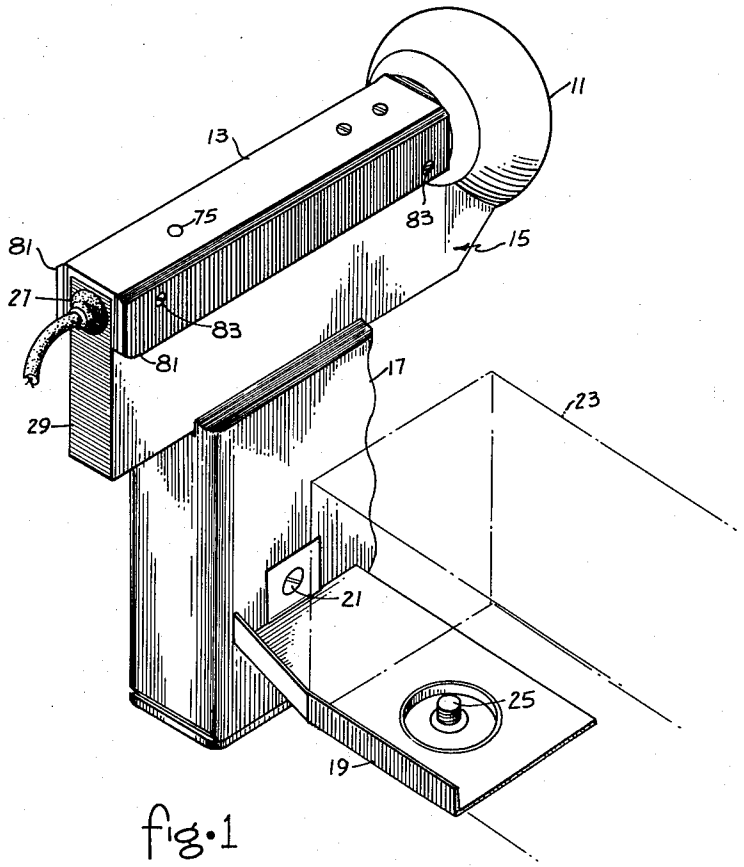


fig. 1

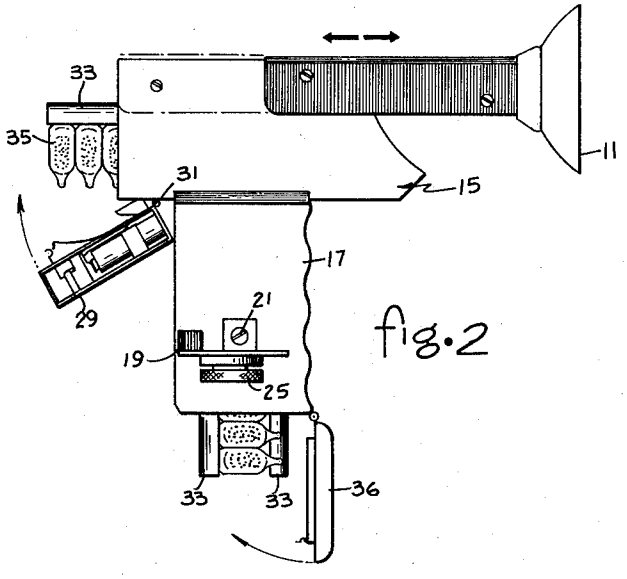


fig. 2

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FLASHGUN

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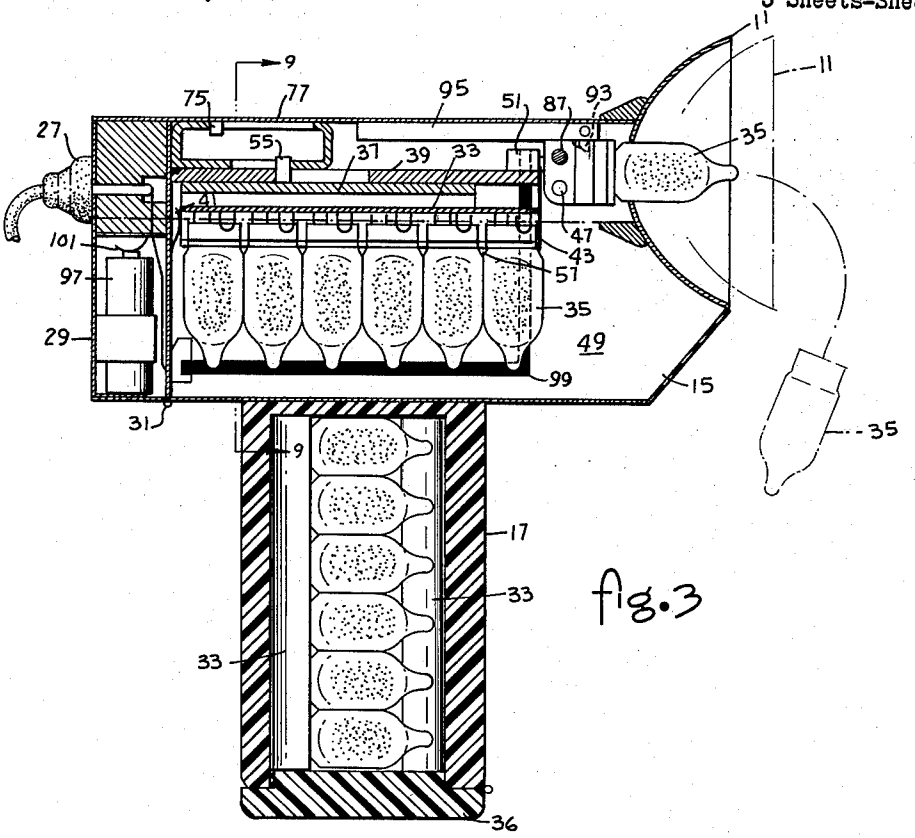


fig. 3

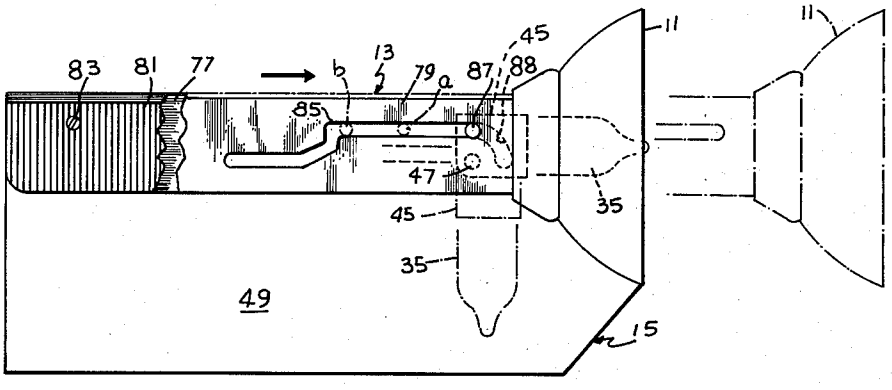


fig. 4

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FLASHGUN

Filed Dec. 30, 1959 3 Sheets-Sheet 3

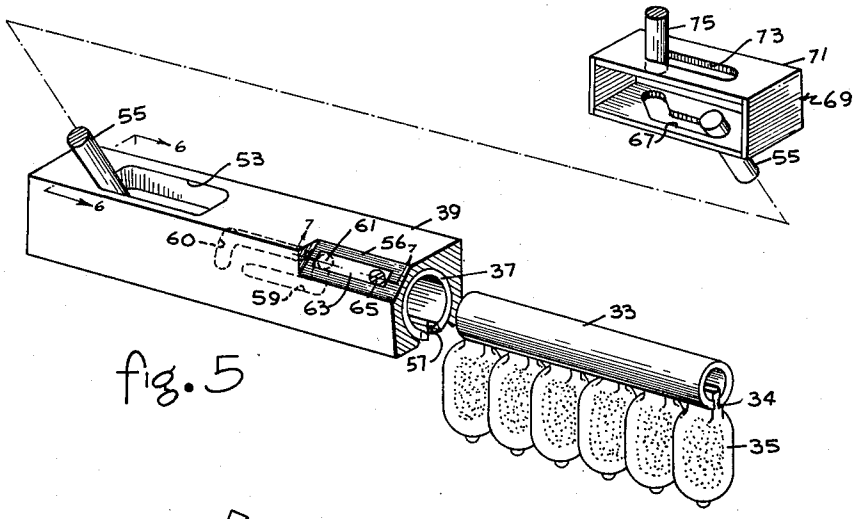


fig. 5

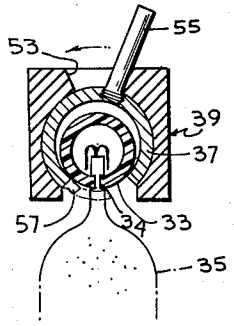


fig. 6

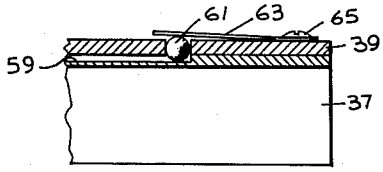


fig. 7

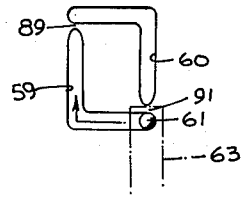


fig. 8

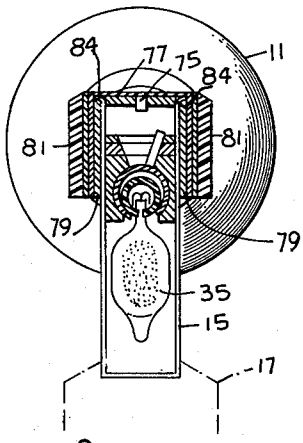


fig. 9

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FLASHGUN

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Filed Dec. 30, 1959, Ser. No. 862,903
5 Claims. (Cl. 240—1.3)

This invention relates to photoflash lamps, often called flashbulbs, and to equipment for their use. In particular, it relates to flashbulb equipment in which several bulbs can be flashed successively without reloading, such equipment being herein referred to as a flashgun.

In the usual flashgun several operations have to be performed manually in the flashing of a bulb, and the inconvenience of carrying extra bulbs is a decided disadvantage. Other types of flashguns have been made that reduce the number of operations to be performed but they still leave much to be desired.

An object to this invention is to provide a simplified semi-automatic flashgun capable of firing several flashbulbs successively.

Another object to this invention is to provide convenient storage space in the gun to hold additional bulbs for future use.

In accordance with the principles of this invention, a reciprocating actuating slide automatically ejects the fired bulb from the reflector and reloads a new bulb from within the gun itself.

Other objects, features and advantages of the invention will be apparent from the following specification, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of one embodiment of the flashgun of our invention showing the exterior components, and the relationship between the flashgun and a camera;

FIGURE 2 is an elevational view of the flashgun of FIG. 1 with the actuating slide in its forward position and the loading and storage compartments open;

FIGURE 3 is a cross-section elevational view of the flashgun of FIG. 1 showing in detail the interior chambers of the gun;

FIGURE 4 is an elevational view of the actuating slide assembly in its fully advanced and its fully retracted position, the former being shown in phantom.

FIGURE 5 is a perspective exploded view of the feed mechanism;

FIGURE 6 is a detail of the feed mechanism taken on the line 6—6 of FIG. 5;

FIGURE 7 is a detail of the detent means taken on the line 7—7 of FIG. 5;

FIGURE 8 is an enlarged detailed plan view of the detent means shown in FIG. 7; and

FIGURE 9 is a rear cross-sectional view on the line 9—9 of FIG. 3.

Referring to FIG. 1, the flashgun of this invention comprises a reflector 11 mounted forwardly of a horizontal actuating slide 13. The slide 13 and the reflector 11 are slidably mounted as a unit on and above a stationary firing chamber 15. The chamber 15 is in turn rigidly secured to a grip-sized handle 17, for grasping the flashgun. Projecting laterally to the right from the lower part of the handle 17 is a bracket 19 fixed to the handle by a suitable fastener, such as screw 21. The bracket 19 provides a support means for a conventional camera 23 that is securely held on the bracket by a lock screw 25 shown in phantom lines in FIG. 1. An insulated electrical plug 27 is attached to the rear plate 29 of the firing chamber 15, the other end of the plug 27 is connected to a common flash synchronizer of any suitable type well known in the art.

The flashgun is loaded for operation by inserting a bulb cartridge 33 in the firing chamber 15 by way of the rear plate 29 which is hinged by a spring 31 (FIG. 2). A tubular bulb cartridge 33 of insulating material contains six bulbs 35 positioned side by side and held in place by a slot 34 cut lengthwise of the tubular piece. The cartridge 33 is inserted within an opening formed by a feed claw 37 (FIG. 5). In turn, the feed claw 37 is supported in a bearing block 39 that is fixed in the firing chamber 15 (see FIGS. 3, 5, 6 and 9). The bulb cartridge 33 is held in position by a leaf spring 41. The spring 41 is secured to the hinged back plate 29 and urges the front edge of the cartridge against a stop 43 in the firing chamber.

The gun handle 17 has a hollow storage cavity capable of holding two additional bulb cartridges 33, as seen in FIGS. 2 and 3. The cartridges are inserted in the handle from the bottom which is closed by a hinged plate 36.

As seen in FIGS. 3 and 4, a bulb holder 45 is positioned forwardly of the bearing block 39 and the holder is pivoted about a pivot pin 47, the pin 47 being rigidly secured to the side plates 49 of the firing chamber 15. The bulb holder 45 is shown at its firing position in FIG. 3 and at its loading and firing positions in FIG. 4. The loading position is the location where a bulb 35 can be fed into the bulb holder 45 preparatory to the firing cycle as will be explained hereinafter. An electrical contact base 51 (FIG. 3) is fixed at the forward top part of the bearing block 39. The base will provide a means for flashing the bulb 35 when the bulb is held in the holder 45 at the firing position as seen in FIG. 3.

The bearing block 39 is of rectangular shape, the length of which is bored to receive the movable feed claw 37 (see FIGS. 5 and 6). The bottom portion of the bearing block is cut away to provide operational room for the feed claw 37. A rectangular shaped guide slot 53 is cut in the rear top part of the bearing block through which a pin 55, fixed to the feed claw, extends. A portion of the front right-hand corner of the bearing block 39 is cut to provide a flat surface 56 for supporting a feed claw detent means.

As mentioned above, the tubular feed claw 37 is positioned in the bore of the bearing block 39 and has a segment cut from its length. Formed on one edge of the cut-away slot is a series of equally spaced angular teeth 57. Formed on the outer barrel circumference of the feed claw 37 are two L-shaped tracks 59, (FIG. 8) forming a rectangular track, similar to the shape of slot 53 (FIG. 5). A hole large enough to receive a detent ball 61 is formed on the flat surface 56 of the bearing block. The hole extends through the outer casing of the bearing block 39 and is located above one part of the L-shaped groove 59 that is designated the starting position or home position of the feed claw. The detent ball 61 rests in one part of the groove 59 and is held in place by a leaf spring 63 that is secured to the flat surface 56 by a screw 65. With the above described arrangement the feed claw 37 can be moved in a rectangular path, guided by the slot 53 in the bearing block 39 and detented in different positions as will be described hereinafter.

As may be seen in FIGURE 5, the pin 55 of the feed claw projects, as mentioned above, through the guide slot 53 of the bearing block 39. The top of the pin 55 terminates in an angular slot 67 located in the bottom plate of a box cam 69. The box cam 69 has a top plate 71 having a straight slot 73. A pin 75, that is fixedly mounted to the bottom side of a U-shaped cover plate 77 (FIG. 9) of the actuating slide 13, extends into the straight slot 73.

The firing chamber 15 of the flashgun is a U-shaped member having its top opened. A pair of cam slides 79, one located on each side of the firing chamber 15, are

positioned between the side plates 49 and an inverted U-shaped cover plate 77. A pair of grip handles 81 are located on opposite sides of the U-shaped cover plate 77. The grip handles 81, the U-shaped cover 77 and the cam slides 79 are securely fastened together by screws 83 (see FIG. 1) to provide the unitary structure of the actuating slide assembly. The side plates 49 of the firing chamber 15 have offset nibs 84 (FIG. 9) at their upper ends, projecting outwardly and lying between the cam slides 79 and the U-shaped cover plate 77, forming a track for the reciprocation of the actuating slide 13.

The cam slides 79, one lying on each side of the firing chamber 15, have cam slots 85, the right-hand cam slide 79 being shown in detail in FIG. 4. A pair of pins 87 projecting from opposite sides of the bulb holder 45 are guided in the cam slots 85. The purpose of this pin and slot arrangement is to move the bulb holder 45 from a horizontal firing position to a 90° vertical loading position, as shown in FIG. 4. This is accomplished when the actuating slide 13 is moved to its forward position as will be described hereinafter. An arcual clearance slot 88 is provided in the side plates 49 of the firing chamber for the free movement of the bulb holder 45 as it travels from its loading to its firing position.

To feed a bulb 35 into the bulb holder 45, at the proper time, the feed claw 37 has to function to move its teeth 57 into the interdental spaces between the bulbs, and then to advance the bulbs toward the bulb holder 45 when the bulb holder 45 is at its vertical loading position. This will place the first bulb in line into the bulb holder 45, after which the feed claw teeth 57 will be rocked out of engagement with the bulbs and then the claw 37 will be returned to its original position. This requires a square motion of operation and is accomplished in the following manner.

The actuating slide 13, when moved to its forward position, to reload the flashgun, will, by virtue of the pins 75 and 87 and the cam slot arrangements described above, effect the required operation of the gun. The first part of travel of the slide 13 and the pin 75 will have no effect on the feed claw mechanism, but will move the reflector 11 out of the way of the bulb holder 45. This movement will also eject a flashed bulb.

Referring to FIGS. 5 and 6, the pin 75 is shown in its home position at the rear part of slot 73 in the top plate 71 of cam box 69. Therefore, with forward movement of the actuating slide 13 the pin 75 will move to the forward extent of travel in the slot 73 before it will carry the cam box 69 in the same direction. Simultaneously, the pins 87, projecting from the bulb holder 45, as seen in FIG. 4, will be positioned an equal distance in the top horizontal slot of the cam slot 85, to approximately the "*a*" position, shown in phantom lines.

Further movement of slide 13 and pin 75 will carry the cam box 69 forward, thus carrying the bottom slot 67. The angular slot 67 will have no effect on the feed claw pin 55 that is positioned in the slot until the angle of the slot is in register with pin 55. However, just before pin 55 reaches this offset angle, the slide 79 has moved the same distance, positioning the pin 87 approximately at "*b*" position in the slot. The above-mentioned travel of slide 13 has now moved the reflector 11 clear of the bulb holder 45.

On continued forward travel of the actuating slide 13, the pin 75 and cam box 69 will now, by virtue of the angle slot 67, move pin 55 laterally, thus rotating the feed claw 37 to its operative position. The pin 55 will be rotated in a clockwise direction as viewed in FIG. 5 and counterclockwise direction in FIG. 6. This rotation of the feed claw 37 will position the teeth 57 of the feed claw into the space between the bulbs 35 held in the cartridge 33. Simultaneously with this movement, the angle of the cam slot 85 will rock the bulb holder 45 from its horizontal firing position to its 90° vertical loading station, as viewed in FIG. 4.

At this time it is now necessary to provide a forward movement to the feed claw 37 to feed a bulb 35 from the bulb cartridge 33 into the bulb holder 45. The position of the actuating slide 13 will have the pin 55 positioned at the rear of the angle slot 67. The cam box 69 will continue to travel with the actuating slide 13, carrying the pin 55 with it. The pin 55 is carried forward to the forward limit of the guide slot 53. The pin 55 being fixed to the feed claw 37, as mentioned above, will move the feed claw the same distance. This movement of travel will advance the bulbs 35 located in the bulb cartridge 33 one step, placing the first bulb of the cartridge into the positioned bulb holder 45.

The detent means for the feed claw 37 as mentioned above is designed to guide the feed claw 37 in a prescribed square motion that is required for the operation of the feed claw. Referring to FIG. 8, the detent ball 61 is shown in its home position in slot 59 and follows a square-like pattern in the L-shaped grooves 59 and 60. The grooves 59 and 60, as mentioned above, are cut in the outer circumference of the feed claw 37. Therefore, when the feed claw 37 is moved, the detent ball follows, as the size and shape of the guide slot 53 and the limits of the L-shaped tracks are identical.

Therefore, when the feed claw 37 is first rotated, as mentioned above, the detent ball 61 will follow in a lateral direction, as in the direction of the arrow in FIG. 8. And with continued forward movement of the slide 13 to advance the feed claw 37, the ball 61 will follow to the end of track 59 where it will jump over an uncut portion 89 between the tracks 59 and 60 and rest in the beginning of track 60. The purpose of the uncut portion 89 is to form a resistance to the ball and to prevent the ball and the feed claw 37 from moving in an undesired direction. With continued movement of the slide 13 in a reverse direction as will be described hereinafter, the ball 61 will follow the track 60 in a reverse direction jumping a second uncut portion 91 between tracks 60 and 59 back to its home position.

With the completed motion of feeding a bulb 35 from the bulb cartridge 33 into the bulb holder 45, the actuating slide 13 will be in its forward limited position as seen in FIG. 2. The return of the slide 13 to its home position will move the feed claw 37 out of engagement with the bulbs 35 and will return the feed claw 37 back to its home position. Simultaneously therewith, the bulb holder 45 will be moved from the vertical loading position to a horizontal firing position with a new bulb held therein.

The movement of the bulb holder 45 will be completed before the actuating lever 13 and the reflector 11 reach the home position. This allows the bulb 35 in the bulb holder 45 to be in line with the opening of the reflector 11 for placement therein.

These functions are performed by the identical cam means and with the detent 61 forming a reverse motion. Briefly, the pin 75 will travel to the rear of the slot 73 and will then carry the cam box 69. The angle slot 67 of the cam box 69 will then rotate the feed claw 37 out of engagement with the bulbs 35 and by the pin 55 in the guide slot 53 the feed claw 37 will be returned back to its original position.

Current for the flashing of a bulb is supplied to the flashbulb when the bulb is in the designated firing position by a dry cell battery 97 located in a hollow portion of the rear plate 29 (FIG. 3). A source of current from the battery 97 is supplied to the fixed electrical contact point 51 over a flat conductor 99 taped to the side plate 49 of the firing chamber 15. When the bulb holder 45 is in firing position, the bulb holder 45 will contact the electrical contact point 51, thus giving the needed current for firing a bulb 35. The insulated electrical synchronizer plug 27 is also electrically connected to the battery 97 by way of conductor 101. An optional modification of a B.C. (battery-condenser) can be used with the above described arrangement.

After completion of firing a bulb 35, the bulb located in the reflector 11 will be ejected from the bulb holder 45 on the start of a new cycle, that is, when the actuating slide 13 is moved forward at the beginning of a new cycle as was mentioned previously. An ejection mechanism, consisting of a yieldable node 93 is pivoted on a bracket 95 fixed to the bottom of plate 77 of the actuating slide 13. The node 93 is so constructed that it will yield when a bulb 35 approaches from within the firing chamber 15, but is held rigid when contacted from the opposite direction. Therefore, when the node 93, attached to slide 13, contacts a bulb held in the holder 45, it will force the bulb 35 from the gripping means of the holder, thereby ejecting the fired bulb out of the front of the reflector 11 as seen in phantom lines in FIG. 3. A repeated motion of the reciprocation of slide 13 will begin a new cycle of operation until the six bulbs in the cartridge are depleted.

What we claim is:

1. A repeating photoflash gun comprising: a horizontally disposed stationary chamber; a horizontally disposed slide reciprocably mounted on the top of said chamber for movement longitudinally with respect thereto; a reflector, having a central aperture, mounted on an end of said slide; a plurality of aligned bulbs disposed side-by-side in said chamber longitudinally thereof; a bulb holder; means for pivotally mounting said bulb holder in said chamber forward of said aligned bulbs, said bulb holder being swingable through about ninety degrees from a bulb-receiving position with respect to said aligned bulbs to a position in alignment with said aperture in said reflector; and means connecting said slide to said bulb holder whereby reciprocation of said slide actuates said pivotally mounted bulb holder to effect movement thereof to and from said positions.

2. A repeating photoflash gun comprising: a horizontally disposed stationary chamber; a horizontally disposed slide reciprocably mounted on the top of said chamber for movement longitudinally with respect thereto; a reflector, having a central aperture, mounted on an end of said slide; a plurality of aligned bulbs disposed side-by-side in said chamber longitudinally thereof; a bulb holder; means for pivotally mounting said bulb holder in said chamber forward of said aligned bulbs, said bulb holder being swingable through about ninety degrees from a bulb-receiving position with respect to said aligned bulbs to a position in alignment with said aperture in said reflector; means connecting said slide to said bulb holder whereby reciprocation of said slide actuates said pivotally mounted bulb holder to effect movement thereof to and from said positions; and means disposed in said chamber for sequentially advancing each of said aligned bulbs to said bulb holder.

3. A repeating photoflash gun comprising: a horizonally disposed stationary chamber; a horizontally disposed slide reciprocably mounted on the top of said chamber for movement longitudinally with respect thereto; a reflector, having a central aperture, mounted on an end of said slide; a plurality of aligned bulbs disposed side-by-side in said chamber longitudinally thereof; a bulb holder; means pivotally mounting said bulb holder in said chamber forward of said aligned bulbs, said bulb holder being swingable through about ninety degrees from a bulb-receiving position with respect to said aligned bulbs to a position in alignment with said aperture in said reflector; means disposed in said chamber for sequentially advancing each of said aligned bulbs to said bulb holder; and means connecting said slide to said bulb holder and means connecting said slide to said bulb advancing means whereby reciprocation of said slide actuates said pivotally mounted bulb holder to effect movement thereof to and from said positions, and said reciprocation of said slide also actuates said bulb-advancing means.

4. A repeating photoflash gun comprising: a horizontally disposed stationary chamber; a horizontally disposed slide reciprocably mounted on the top of said chamber for movement longitudinally with respect thereto; a reflector, having a central aperture, mounted on an end of said slide; a plurality of aligned bulbs disposed side-by-side in said chamber longitudinally thereof; a bulb holder; means for pivotally mounting said bulb holder in said chamber forward of said aligned bulbs, said bulb holder being swingable through about ninety degrees from a bulb-receiving position with respect to said aligned bulbs to a position in alignment with said aperture in said reflector; and means connecting said slide to said bulb holder whereby reciprocation of said slide actuates said pivotally mounted bulb holder to effect movement thereof to and from said positions, and moves said reflector into and out of encompassing relationship with respect to a bulb in said bulb holder.

5. A repeating photoflash gun comprising: a horizontally disposed stationary chamber; a horizontally disposed slide reciprocably mounted on the top of said chamber for movement longitudinally with respect thereto; a reflector, having a central aperture, mounted on an end of said slide; a plurality of aligned bulbs disposed side-by-side in said chamber longitudinally thereof; a bulb holder; means for pivotally mounting said bulb holder in said chamber forward of said aligned bulbs, said bulb holder being swingable through about ninety degrees from a bulb-receiving position with respect to said aligned bulbs to a position in alignment with said aperture in said reflector; means connecting said slide to said bulb holder whereby reciprocation of said slide actuates said pivotally mounted bulb holder to effect movement thereof to and from said positions; and bulb ejection means attached to said slide adjacent to and rearwardly of said reflector, said bulb ejection means being actuated by reciprocation of said slide.

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