

Dec. 23, 1958

W. W. BURROUGHS
REPEATING PHOTOFLASH GUN

2,866,085

Filed Aug. 7, 1953

4 Sheets-Sheet 1

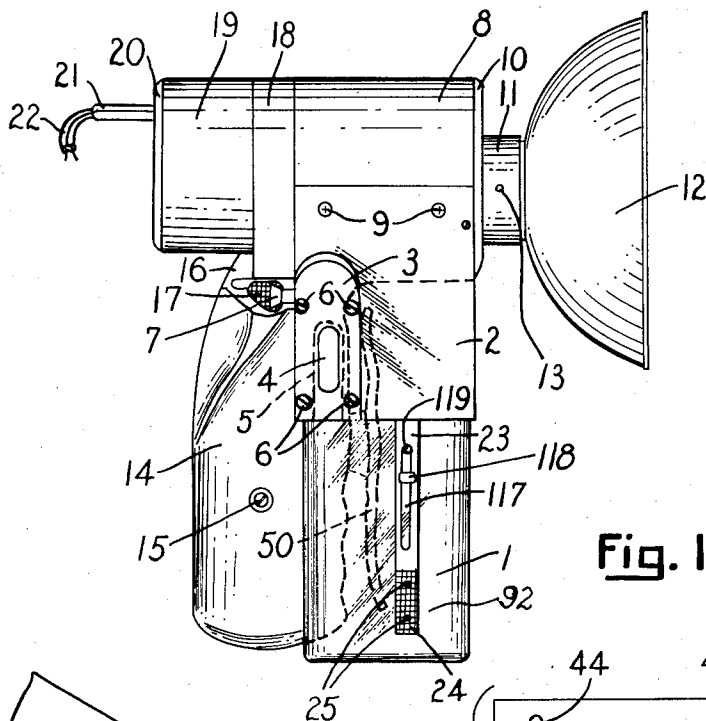


Fig. 1

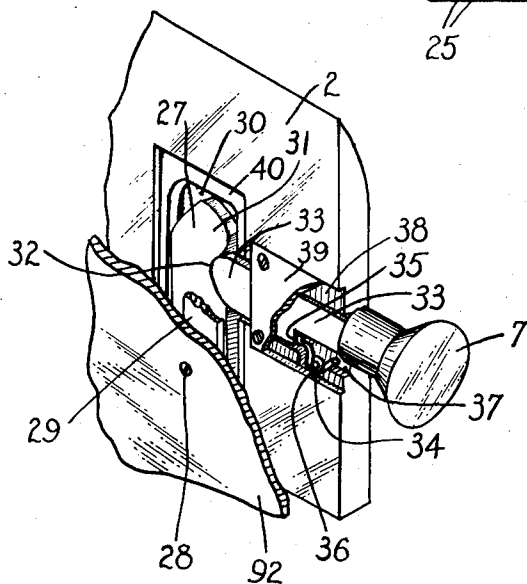


Fig. 2

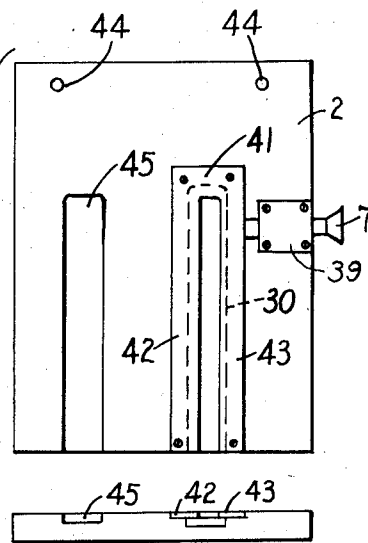


Fig. 3

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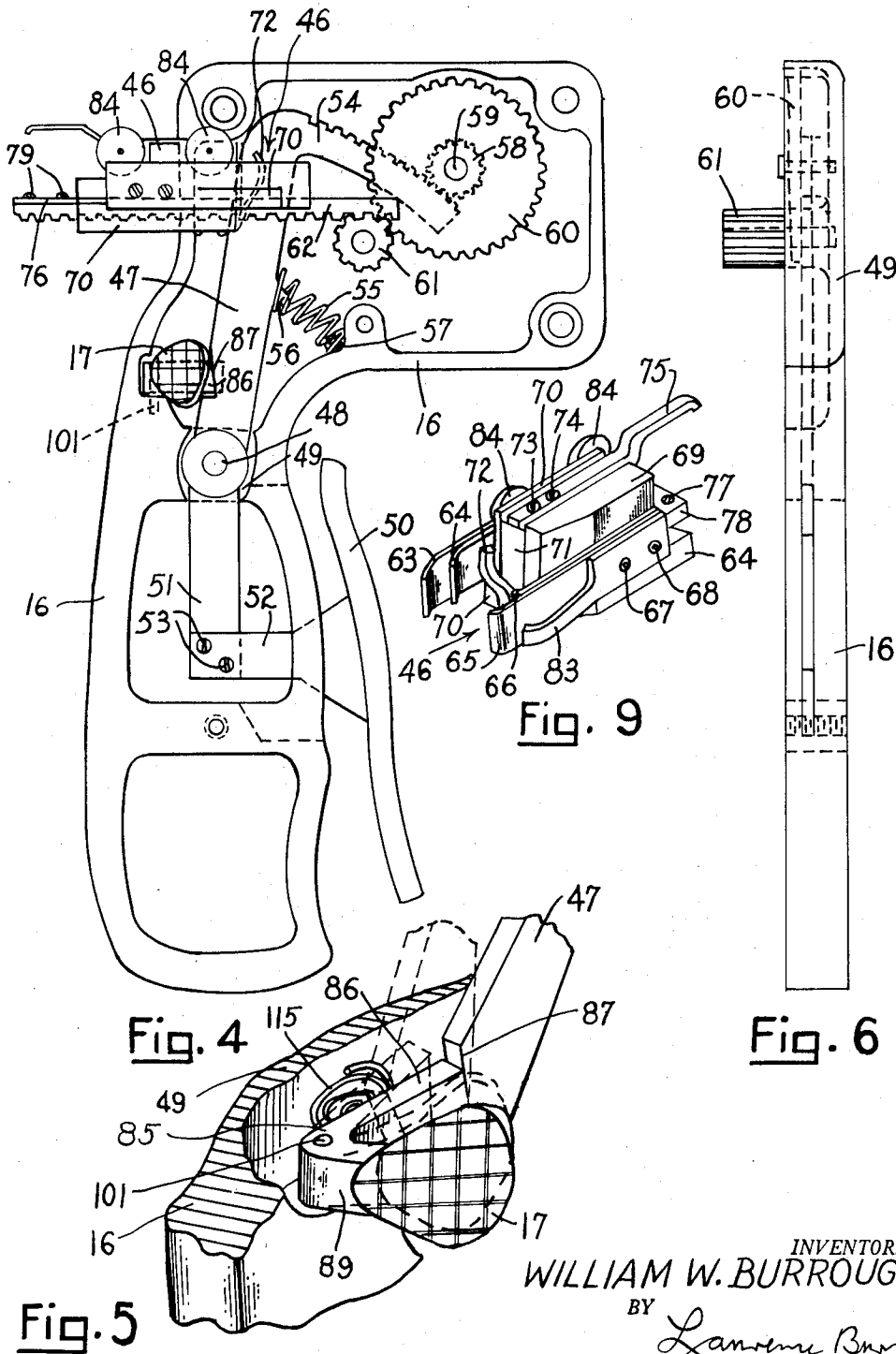
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4 Sheets-Sheet 3

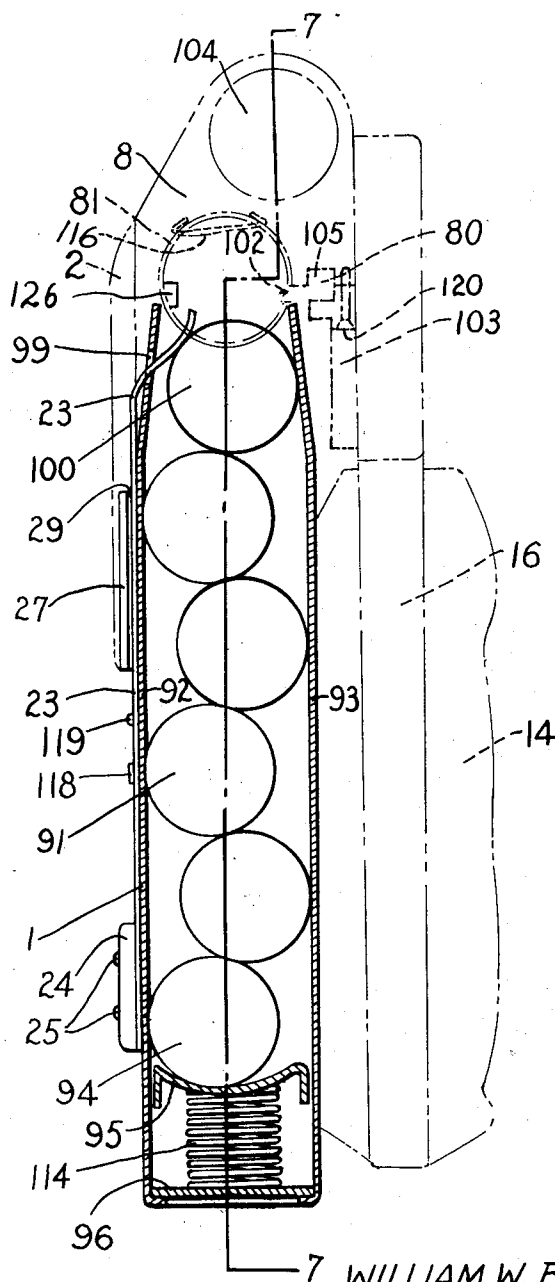


Fig. 7

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4 Sheets-Sheet 4

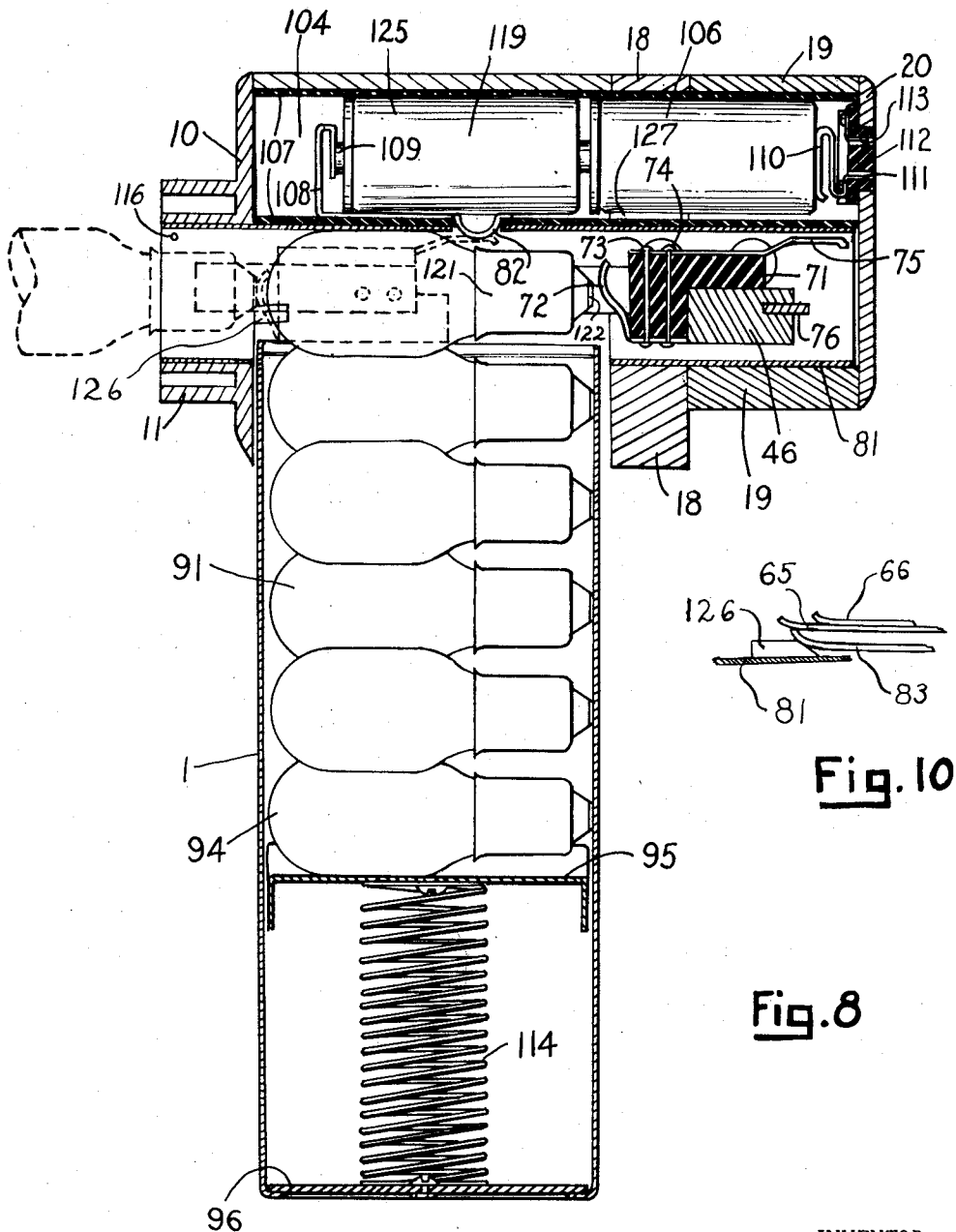


Fig. 10

Fig. 8

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2,866,085

REPEATING PHOTOFLASH GUN

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12 Claims. (Cl. 240—37)

This invention relates to photoflash lamps, often called flash bulbs for convenience, and to operating equipment for such flash bulbs. In particular, it relates to flash bulb equipment in which several bulbs can be flashed successively without reloading, such equipment being herein referred to for convenience as a flash gun.

In the usual flash gun, a bulb is inserted into a socket by hand, flashed, and thereafter removed by hand or by a release trigger, and another flashbulb inserted by hand. This is a time-consuming and awkward procedure. Attempts have been made to produce a repeating flash gun, holding several bulbs to be flashed successively by a hand-operated trigger action. However, the bulbs for such devices have been mounted on a ring or on an endless belt and have been cumbersome and inconvenient.

The present invention provides a repeating flash gun fed from a flat magazine into which several bulbs can be placed roughly in line and fed successively into a bulbholder, flashed and ejected. Such a device can be quite compact and convenient in use, and positive in action.

In one embodiment of the invention, a bulbholder is moved back and forth in response to manual actuation, in a chamber which is in communication with a reflector and with a flat magazine, the latter holding several bulbs roughly in line but slightly staggered and urged toward the chamber by a spring. When the bulbholder is moved forward in the chamber it grasps a bulb and moves it into the reflector, holding it in position there until flashed; the retraction of the bulbholder after flashing ejects the flashed bulb and leaves the holder in position to be again moved forward to grasp another bulb for insertion in the reflector. The motion required for the bulbholder depends on the size and shape of the bulb, and with the bulbs here described will generally be greater than can be obtained by a lever pressed by a hand holding the gun, so a mechanism is provided for moving the bulbholder a greater distance than the lever can be pushed by hand.

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

Fig. 1 is a side elevational view of one embodiment;

Fig. 2 is a detail view of the latch for holding the magazine to a sideplate of the flash gun;

Fig. 3 is a pair of views showing the inner side of the sideplate and its edge;

Fig. 4 is a profile view of the mechanism for reciprocating the bulbholder;

Fig. 5 is a cutaway perspective view of the handle-frame and the mechanism for locking the bulbholder in the forward position;

Fig. 6 is an edge view of the handle-frame;

Fig. 7 is a transverse sectional view through the magazine, showing the surrounding mechanism of the bulb in phantom;

Fig. 8 is a side section through the magazine and cylinder of the gun;

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Fig. 9 is a perspective view of the bulbholder alone; Fig. 10 is a detail view of the cam for actuating the spring fingers for gripping the bulb.

In Fig. 1, the magazine 1 is attached to the sideplate 2 by a suitable latching mechanism, one convenient form of latch being shown in Figs. 2 and 3. The sideplate 2 also carries a suitable camera attachment plate 3, of a type well-known in the art. The camera attachment plate 3 contains the usual opening 4 and has a slot 5, shown dotted, on its other side and in communication with the opening and extending to the bottom edge of attachment plate 3, which is held to sideplate 2 by the screws 6.

The latch release button 7 extends from the side of sideplate 2, which is fixed to a side of flash gun barrel 8 by the screws 9. The front of barrel 8 is closed by the front plate 10; from which the collar 11 extends to hold the reflector 12, which is secured there by the setscrew 13.

The handle plate 14 is attached by screw 15 to a handle frame 16 which extends downward from the other side of barrel 8. A release finger 17 for the hand grip or lever 50 extends outward from frame 16. The barrel plate 18 and the barrel extension 19 extend rearwardly from barrel 8 and in register therewith, closing off the back of the barrel extension 19 in the back plate 20, into which the electrical contact plug 21 fits in an insulating manner, carrying the insulated wires 22, which can be connected to a common flash synchronizer of any suitable type well-known in the art.

The flat spring 23 has the finger slide 24 held to its bottom end by the small rivets 25. The spring 23 has the groove 117, through which extends the pin 118, fixed to the wall 92 of magazine 1, the pin having a head of sufficient size to hold spring 23 in place. A stop pin 119 extends into groove 117 from sidewall 1 to limit the downward motion of spring 23 and to align it.

The latching arrangement for holding magazine 1 to sideplate 2 in a detachable manner is shown in detail in Fig. 2, because it is hidden in Fig. 1 by the attachment plate 3 and the sideplate 2. A sidewall 92 of magazine 1 carries the latch-tongue 27, which is held to the sidewall 92 by screws, of which one screw 28 is shown, the spacer 29 of smaller width than tongue 27 being interposed between said tongue 27 and said sidewall 92 to space said two members apart.

The tongue 27 extends upwardly into a slot 30 on the inside face of sideplate 2, said sideplate 2 having been turned around from its position in Fig. 1, so that in Fig. 2 the inside face is toward the observer.

The tongue 27 is rounded at its top 31, and just therebelow carries the notch 32, into which the latchpin 33 extends under the biasing action of the hairpin spring 34 which bears against the step 35 in latchpin 33 and also against the recess 36 in step 37 out into the inside face of sideplate 1. Step 37 and step 38 form opposite sides of a slot in which the latchpin 33 can slide. A flat latchplate 39 fits over the step 37 and 38 and to be flush with the inside surface of the sideplate 2, that is, latchplate 39 fits into the wider groove formed by the outer limits of the steps 37, 38.

A shallower slot 40 of greater width than that of slot 30 is in register with the latter slot and allows a U-shaped flat cover piece 41, shown in Fig. 3, to be used over slot 30. The thickness of latch tongue 27 is small enough so that said tongue makes a sliding fit into the inner slot 40 after U-shaped core piece 41 is in place. The distance between the legs 42, 43 of the U is slightly larger than the width of the spacer 29 to permit the latter to move in the space between said legs 42, 43 of said U-shaped piece 41.

The interior face and bottom edge of sideplate 2 is shown in full in Fig. 3. At the top of the plate are the holes 44, through which the screws 9 (shown in Fig. 1)

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can pass. The sideplate 2 contains the slot 45, which is positioned to be in register with the spring 23 of magazine 1 when the latter is in position. The slot 45 should be of somewhat greater width than said spring 23, and the depth should be sufficient to allow clearance for said spring when the magazine 1 is attached to sideplate 2. The other features shown in Fig. 3 have already been described with reference to Figs. 1 and 2.

The hand-actuated mechanism for moving bulbholder 46 back and forth is shown in Fig. 4. The bell crank 47 is pivoted to handle frame 16 by the pin 48 which is fixed to the back plate 49 of the handle frame 16. The handgrip 50 or lever is attached to one end 51 of bell crank 47 by the connecting bar 52 which is attached to bell crank 47 by screws 53. The other end of bell crank 47 carries the rack 54, which is curved to the circumference of a circle concentric with the center of pin 48. A coiled spring 55 extends between nub 56, extending from bell crank 47, and nub 57, extending from handle frame 16. The spring 55 tends to urge the top portion of bell crank 47 away from nub 57.

The pinion 58 is held in mesh with rack 54 by the pin 59, about which pinion 58 turns. Pinion 58 is fixed to a larger gear 60 which also turns about pin 59, and which in turn meshes with a second pinion 1, which is of sufficient width to be in mesh with the straight rack 62, which carries the bulbholder 46, shown in more detail in Figs. 3 and 9.

In the bulbholder 46, there are two opposed pairs of metallic spring fingers, one pair 63, 64 and another pair 65, 66, between which the base of the flash bulb can be gripped and through which electrical connection to the base shell contact can be made. These are attached, for example, by screws 67, 68, to the blocks 69, 70, which are electrically insulated from each other by the insulating block 71, which can be of bakelite, for example. The spring metal piece 72 is in position to make electrical connection to the eyelet contact of the flash bulb base, and extends along the bottom of the insulating block 71, as shown in more detail in Fig. 8, being held there by screws or rivets 73, 74 which pass through the insulating block 71 to the top thereof, where they are secured to a metal contact strip 75. The contact strips 72, 75 and thin connecting screws 73, 74 are arranged to be in electrical contact with each other, but out of electrical contact with the other metal parts of bulbholder 46, to prevent short-circuiting the flash bulb.

A bracket 76, fixed to the metal blocks 69, 70 by screws 77 passing through the transverse block 78, is fixed also to the rack 62 by the screws 79.

The rack can move back and forth in its supporting slot 80, shown in Fig. 7. The metal contact strip 75 is bent to be out of contact with cylinder 81 in Fig. 8, so that when the bulbholder moves forward the strip 75 can be in connection with contact 82 which extends a short distance into cylinder 81.

Extending outward from pins 67, 68 of spring fingers 65, 66 on bulbholder 46 is an additional spring finger 83 which makes contact with the sidewall of the metal cylinder 81 of Fig. 7, thus helping to keep the bulbholder 46 in alignment within the cylinder and insuring good electrical contact thereto. A similar spring finger is present with the pair of spring fingers 63, 64 on the other side of the bulb. A pair of wheels 84, 84 are rotatable about pins which hold them to the thin top plate 85 extending upward from block 70. These wheels bear on the inner wall of cylinder 81 in Fig. 7.

Figure 5 shows the pivoted V-pin 86, one side 86 of the V extending into a notch 87 in bell crank 47 to hold said crank 47 locked against backward motion until the release button 17, on leg 80 of the V, is pushed. The conical-helical coiled spring 115 normally pushes leg 86 out from back plate 49, so that when the notch 87 is in register with the leg 86, the latter will automatically slip into locking position. The apex of the V is pivoted on pin 101, fixed to handle frame 16.

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In Figure 7, the flash bulbs 91 are shown in magazine 1, the internal distance between the sidewalls 92 and 93 being somewhat larger than the bulb diameter to permit the bulbs to assume the staggered relationship shown, to permit better feeding of the bulbs to the cylinder 81. The interwall distance shown is about $1\frac{1}{4}$ bulb diameters in extent.

The bottom bulb 94 rests against the plunger 95, with a coiled spring 114 biasing said plunger away from the bottom 96 of the magazine 1.

The flat spring 23 extends along the outside wall of the magazine 1, being slidably fixed thereto by the pin 118 attached to a sidewall 92 and by the stop 119, as previously explained. Magazine 1 has an opening 99 through which spring 23 extends thereto, to rest against the top flash bulb 100 at a spot above its center to retain the bulb 100 in position until needed.

The cylinder 81 into which the bulb is urged by spring 114 has a slot 102 in one side, in communication with slot 80 in which the rack 62 moves back and forth in response to actuation of the hand grip or lever 50. The plate 103 is attached to the side of the bottom edge of barrel 8 by screw 120 to form the bottom of the slot, the top being formed by the groove 80 in barrel 8. The bulb holder bracket 76 extends from the rack 62 (omitted from Fig. 6 for clarity) through the slot 102 in cylinder 81 to the bulbholder 46 which would be in cylinder 81.

The battery chamber 104 is shown in barrel 8. In Fig. 8, the dry cells 125, 106 are stacked in line in chamber 104, inside the insulating tube 107. A spring contact 108 extends from the center contact 109 of cell 125 to a contact 82 extending through and into cylinder 81, but insulated therefrom. The spring contact 108 is insulated from the metal shell of dry cell 125 by the insulating cylinder 119 normally present around such dry cells. A spring 110 extends from one contact 111 of the plug receptacle 112 to the back of the outer metal shell of cell 106. The other contact 113 of receptacle 112 is connected to the metal of the back plate 20. A spacer 127, of the same thickness as spring contact 108, is placed under cell 106.

In operation, the finger slide 24 on the spring 23 of magazine 1 is pushed down until the top of the groove meets stop 118 and the magazine 1 is then filled with flash bulbs 91, stacked one above the other. The bulbs 91, 94, 100 will assume a slightly staggered relationship, because the inside width between walls 92 and 93 is greater than the bulb diameter. This staggering has been found to facilitate feeding of the bulbs. Tubular flash bulbs are especially suited for such filling.

When the bulbs have been put into the magazine through its open end, the finger slide 24 is pushed up until the bent end of spring 23 slips around the top bulb 100 and holds it in place, thereby keeping the bulbs 91 below it in place also.

The filled magazine 1 is then pushed up on the inside face of sideplate 2 until the tongue 27 enters the slot 30 and is engaged by the latchpin 33, being thereby held in place. The portion of spring 23 outside the magazine wall 92 fits into slot in sideplate 2. The finger slide 24 is then pushed down to allow the bulb 100 to enter the cylinder 81.

The flash gun will generally be held in the operator's left hand (the right hand being on the camera, held to the gun by a conventional bracket to an attachment plate such as plate 3) which grasps the handle frame 16 around the handle plate 14, with the operator's finger gripping the hand-lever 50. Squeezing lever 50 against handle frame 16 moves bell crank 47 and the curved rack 54 fixed thereto, thereby rotating the pinion 58, in mesh therewith, and its attached gear 60. The latter is in mesh with the other pinion 61, and rotates it, thereby moving rack 62 forward in its slot 80 and advancing the bulbholder 46.

In moving forward, the opposite pairs 63—64 and 65—66, of spring metal fingers engage the metal shell 75 121 of the base of flash bulb 100, holding it and making

electrical contact thereto. The advancing of the bulbholder 46 will bring the center spring metal pins 72 into contact with the eyelet contact 122 of flash bulb 100.

The further advance of bulbholder 46 will push the bulb against the chordal wire 116, which restrains the entry of the bulb 100 sufficiently to press the same back more firmly against the contacts 63—64, 65, 66, and 72, thereby insuring good contact, but which is held loosely enough to be capable of sufficient motion to allow the bulb 100 to pass by it. At the end of the travel of the bulbholder 46, the larger-diameter tubular portion of the bulb 100 extends beyond the wire 116 so that said wire 116 will prevent the bulb's travel back when the lampholder is retracted, thereby ejecting the bulb.

When the bulbholder 46 is at the most forward point of its travel, the bulb is at the focal point of the reflector 12, being positioned there by bulbholder 46, and is in electrical connection with the said bulbholder. At this point the metal contact strip 75 is resting against the contact 82 in the topwall of cylinder 81, and spring fingers 83 are pressed inwardly toward the bulb on each side thereof by the stationary cam pieces 126, attached to the forward part of cylinder 81, to insure a firm grip on the bulb by urging fingers 63, 64, 65, 66 thereagainst.

The bulb can then be flashed, for example, by one of the usual camera synchronizing devices to set off the flash when the camera shutter is opened.

When the bulbholder 46 is in its forward position, holding a lamp in reflector 12, one leg 86 of the V-pin 85 is pushed into the notch 87 in bell crank 47 to lock the latter in position. This keeps the bulbholder 46 from retracting if the finger pressure on hand lever 50 is released and insures that the bulb is in the most forward position for proper focus.

Pressing on the release finger 17 will release V-pin 85 and allow the bulbholder 46 to be retracted by coil spring 55. The wire 117 will prevent bulb 100 from moving backward with the holder 46, and will thereby eject the latter, as previously described.

As the bulbholder 46 is retracted, a new bulb 100 will be pushed up into cylinder 81 by the coiled spring 114, and the device will be ready for another cycle of operation.

What I claim is:

1. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a holder for grasping a flash bulb; means for feeding a flash bulb from said magazine to said holder; and a hand-lever grip for actuating said means.

2. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a holder for grasping a flash bulb; means for feeding a bulb from said magazine to said holder; a hand-lever grip for actuating said means; and means, actuated by the release of said hand-lever grip, for ejecting a bulb from said holder.

3. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a reciprocable holder for grasping a single flash bulb; means for advancing said holder to grasp a bulb from said magazine; means for ejecting said bulb from said holder; and means for retracting said holder.

4. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a cylinder in communication with said magazine; means for urging a flashbulb from said magazine into said cylinder; a flash bulb holder for grasping a flash bulb and reciprocable in said cylinder; means for advancing said holder in said cylinder to grasp said flash bulb and hold it in position for flashing; means for ejecting said flash bulb during retraction of said holder from said position; and means for retracting said holder to allow another flash bulb to enter said cylinder.

5. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a cylinder in communication with said magazine; means for urging a flash

bulb from said magazine into said cylinder; a flash bulb holder for grasping a flash bulb and reciprocable in said cylinder; means for advancing said holder in said cylinder to grasp said flash bulb and hold it in position for flashing; means for retracting said holder; and means for ejecting said flashbulb at the beginning of the retracting motion.

6. A repeating photoflash gun comprising: a magazine for holding several flash bulbs; a reflector for a flash bulb; a holder for grasping and positioning said bulb in said reflector; means for feeding a flash bulb from said magazine to said holder; and a hand-lever for actuating said means.

7. A repeating photoflash gun comprising: a reflector for a flash bulb; a holder for grasping and positioning said bulb in said reflector; a magazine for holding several flash bulbs; means for ejecting a bulb from said holder and feeding a bulb from said magazine to said holder; and a hand-lever for actuating said means.

8. A repeating photoflash gun comprising: a reflector for a flash bulb; a holder for grasping and positioning a tubular flash bulb in said reflector; a magazine for holding several tubular flash bulbs; means for ejecting a bulb from said holder; means for feeding a bulb from said magazine to said holder; and a hand-lever for actuating said means successively.

9. A repeating photoflash gun comprising: a reflector for a tubular flash bulb; means for grasping a tubular flash bulb and positioning it in said reflector; a magazine for holding several tubular flash bulbs; means for feeding a bulb from said magazine to said holding means; manually-operable means for actuating said feeding means; and means between said manually-operable actuating means and said feeding means for multiplying the motion of said actuating means.

10. A repeating photoflash gun comprising: a reflector for a tubular flash bulb; means for grasping a tubular flash bulb and positioning it in said reflector; a chamber in register with said holding means; a magazine in communication with said chamber and detachably connected thereto, said magazine being capable of holding several bulbs; means operating in said chamber for feeding a bulb from said magazine into said holding means; and a manually-operable lever for moving said holding means through said cylinder toward said reflector to position the bulb therein.

11. A repeating photoflash gun comprising: a reflector for a tubular flash bulb, said reflector having an opening through which a flash bulb can be inserted; a chamber in register with said opening; a bulbholder capable of reciprocating in said chamber; an opening in the side of said chamber through which a flashbulb can be inserted into said chamber; a magazine in register with and in communication with said opening in said chamber and being capable of holding several flash bulbs; a spring in said magazine for urging said bulbs toward said opening; and manually-operated means for reciprocating said holder in said chamber to pick up bulbs from said holder and position them in said reflector.

12. The combination of claim 11, and a flexible stop in the opening of said reflector, said stop being capable of yielding against the pressure of a bulb in said holder to permit said bulb to pass into said reflector but being stiff enough to prevent the return of such bulb with the retraction of said holder, thereby ejecting the same.

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