March 23, 1937. A. KÄLBER 2,074,652

DEVICE FOR FIRING FLASHLIGHT CARTRIDGES

Filed March 2, 1936

Fig.1.

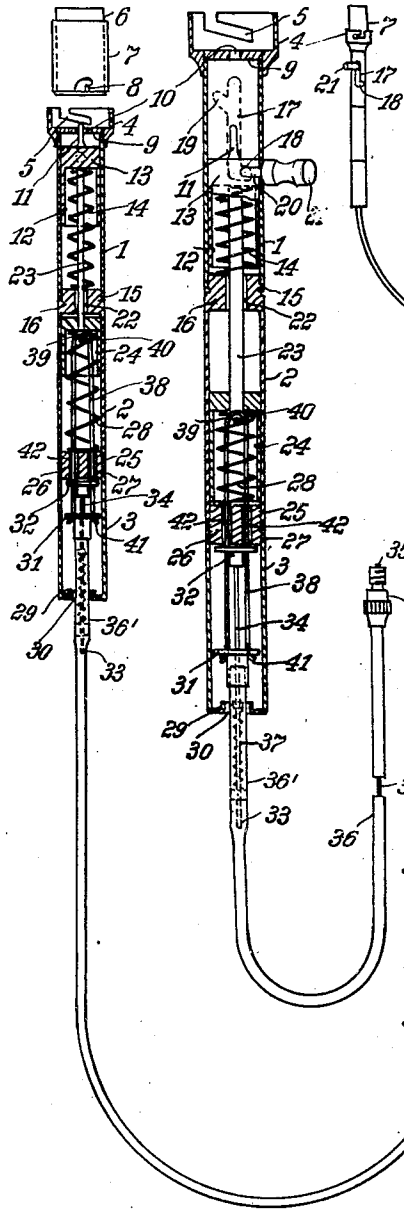


Fig.2.

Fig.3.

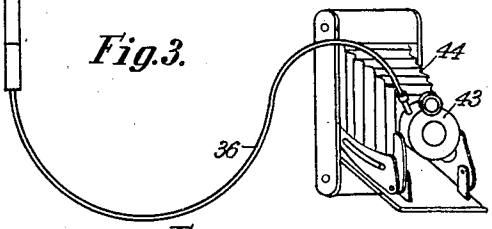


Fig.4.

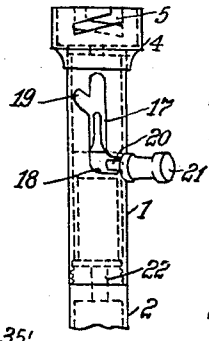


Fig.5.

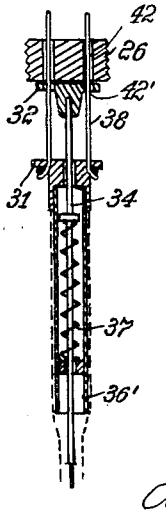


Fig.6.

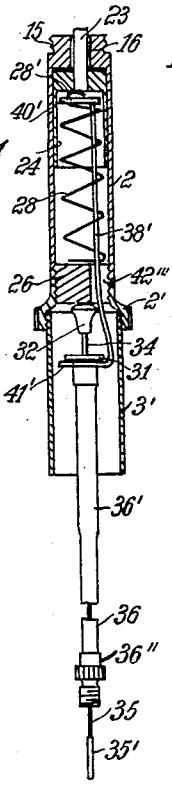
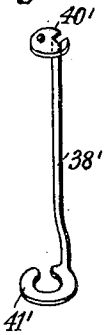


Fig.7.



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Patented Mar. 23, 1937

2,074,652

UNITED STATES PATENT OFFICE

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DEVICE FOR FIRING FLASHLIGHT CARTRIDGES

Albert Kälber, Pforzheim, Germany

Application March 2, 1936, Serial No. 66,752

3 Claims. (Cl. 67—29)

This invention relates to improvements in devices for firing flashlight cartridges and more especially to an arrangement of a device of this character by which simultaneously or substantially simultaneously with the ignition of the cartridge, another device or instrument such as a lens shutter of a photographic apparatus, or any other signalling or recording device such as a clock or the like registering the time of firing, is mechanically actuated.

One of the objects of the invention is to obtain the firing of the flashlight cartridge and the actuation of the said other device—such as a lens shutter—substantially at the same time and in a reliable and mechanically simple manner.

Another object consists in providing a positive relation between the firing and the actuating of the said other device by means which will be always reliable in action and will be also independent from forces or instrumentalities such as electric current or the like.

Further objects and advantages of the invention will be disclosed and explained in the following description with reference to the accompanying drawing, showing a preferred arrangement and one modified constructional form of the same.

In the drawing:

Fig. 1 is a partially sectional longitudinal elevation of a device embodiment of the invention, almost in actual size, showing the same in the position just after the firing of a cartridge (the cartridge being removed from the device) and in the position in which the said other device, such as a lens shutter, is influenced or actuated;

Fig. 2 is a similar section, on a somewhat enlarged scale, in the position ready for firing;

Fig. 3 diagrammatically illustrates in perspective view and upon smaller scale the connection of the device of the invention with the lens shutter of a photographic camera;

Fig. 4 shows in elevation, upon the scale of Fig. 2, the upper end of the device in a position ready for firing;

Fig. 5 is a sectional elevation showing in larger scale the means for connecting a Bowden wire with the cooperating part of the device;

Fig. 6 illustrates a constructional modification of the lower part of the device, applying a different and preferred means for connecting the Bowden wire releaser with the device, and in a position corresponding to Fig. 1; and

Fig. 7 is a perspective view of said preferred connecting means.

The device of the invention comprises a cylindrical casing consisting of a plurality of separate or partial tubes 1, 2 and 3, of substantially equal diameter, connected together in this instance by screw means in a manner later to be described more fully. The upper partial casing 1 terminates at its upper end—being the outer end of the device—in a short cylindrical extension 4, which is open at the upper side and into which, by means of two bayonet slots 5, a fixing sleeve 7 may be connected for fixing a flashlight cartridge 6 as described for instance in my copending application Serial No. 66,751 filed herewith on March 2, 1936 simultaneously. This sleeve 7 is provided with two diametrically opposed projections 8 engaging the said bayonet slots 5, said projections being formed for example by outwardly bent parts of the lower edge of the sleeve.

The short cylindrical sleeve 4 is separated from the hollow part of the casing 1 by a wall 9, having a middle opening 10 allowing for the passage of a firing pin 11.

The firing pin 11 is rigidly connected or else integral with the top part 13 of a hollow piston 12 which is slidably supported in the partial casing 1 and surrounds the upper end of a helical compression spring 14, the other end of said spring being supported upon the upper side of a screw-threaded part 16 at the upper end of the partial casing 2 that engages the internal screw thread 15 at the lower open end of the casing tube 1. Said coil spring 14 tends by its action to drive the piston 12 with the firing pin 11 towards the upper end of the casing 1.

Near its upper end the partial casing 1 is provided with a longitudinal slot of a special form which may best be seen from Fig. 4 and which comprises a straight middle part 17 parallel to the axis of said part 1, having a short lateral extension 18 at the lower end disposed in a nearly peripherical direction, and close to the upper end but a small distance therefrom another lateral extension 19 of hook form or somewhat angularly inclined thereto as shown.

A screw-threaded shank 20 of a button or handle 21 is passed through the said slot 17 into the piston 12 (at its thickened top portion 13) so that by means of said button or handle 21 the piston may be pressed downward by hand from the position shown in Fig. 1, against compression of the spring 14, into the position shown in Fig. 2. In this latter position a slight shift movement of the button in peripherical direction (towards the right in Fig. 4) brings the shank 20 into the extension 18 of the slot. The device is then ready for firing. If the device

has been provided as described with a cartridge and it is intended not to fire it at once but to transport it ready to fire, then it may be secured against unintentional firing by engaging the shank 20 temporarily into the extension 19, the arrangement of which is such that the end of the firing pin 11 then lies shortly below the upper side of the wall 9 and therefore cannot contact with the percussion cap (not shown) which in the ordinary manner is arranged in the bottom of the cartridge.

The screw-threaded part 16 at the upper end of the partial casing 2 is provided with a middle bore 22 through which a rod 23 passes freely. The upper end of this rod is in loose contact with the top portion 13 of the piston 12, and its other end is rigidly connected or integral with another hollow piston 24 slidably supported in the partial casing 2. The casing 2 is provided also at its lower end with an internal screw thread 25, into which a short plug 26 formed with an outer screw thread is partially introduced, and upon the projecting lower end of this plug the upper end of the partial casing 3 is screwed into place by its screw threaded part 27. Said upper end of the plug 26 supports the lower end of a coil compression spring 28 which has its upper end bearing against the bottom of the hollow piston 24 with a tendency to drive said piston toward the upper end of the device. The coil spring 28 is for reasons later described preferably weaker than the spring 14 associated with the piston 12.

The partial casing 3 which in the shown instance ends with an inwardly directed flange 29 having a middle opening 30 therethrough, contains the two buttons 31 and 32 of a Bowden wire 33 of well known construction quite generally used for releasing lens shutters of photographic cameras. As in the ordinary well known use of such a wire, the lens shutters of an associated camera are released by the one button 32, connected by a rod 34 with the inner Bowden wire 35 proper, approaching the other button 31 which is rigidly connected with the outer sleeve 36 of the Bowden wire assembly. A small compression coil spring 37 contained in the somewhat enlarged end 36' of the sleeve 36 is compressed during this action. By this approaching of the two buttons, the free end of the wire 35 proper, which is provided with a small piston 35', is projected beyond the upper end of a part 36'' at the end of the sleeve 36 (see Fig. 1) which is to be screwed into a corresponding part of the lens shutter. If the buttons 31, 32 are released, the spring 37 returns them into their original position (such as shown in Fig. 2). The piston-like part 35' at the end of the wire 35 is during this movement drawn into the part 36'' (see Fig. 1).

This action of the Bowden wire is quite well known and commonly understood, and is described here only in order to make the understanding of the present invention entirely clear.

In connecting the Bowden wire with the device of the invention, in the arrangement according to Figs. 1 and 2, the lower button 31 of the wire is connected with the piston 24 by means of a wire 38 in the shape of a long-legged U, the closed end 39 of the U being connected by any positive means such as a cross-pin 40 with the piston 24, and the free ends or legs thereof being fixed at 41 to the button 31, for instance by bending them under to hook form as shown. The advantage of this form or manner of connection is that the Bowden wire, through the linkage member 38, will be securely attached for all operation of the device, but may, if necessary be easily detached for replacement or exchange of one Bowden wire for another. The intermediate part of the U wire 38 passes freely through parallel bores 42 in the plug 26 and through corresponding bores 42' in the button 32 of the Bowden wire (see Fig. 5).

In the preferred arrangement according to Figs. 6 and 7, the button 31 of the Bowden wire is connected with the piston 24 and the coil spring 28 cooperating with the latter by a metal piece 38' in the form of a sheet metal strip provided at its upper end with a small plate 40' having a hole through which the upper end of said spring 28 is passed (see Fig. 6). The other (lower) end of this piece 38' is provided in the same way with a small plate 41' having a slot or opening of the form shown in Fig. 7, so that the button 31 or the neck thereof of the Bowden wire may be easily "sprung" engaged into this opening. The intermediate part of the piece 38' between the plates 40' and 41' passes through a slot 42'' in the screw-threaded plug 26. This modified connecting means is preferred because it provides for the application or attachment of any Bowden wire of suitable length, without special adaptation work such as boring holes 41 into the button 31 as in the first described form (of Figs. 1–5).

As above stated, the part 36'' of the Bowden wire is adapted to be connected with a cooperating device such as the lens shutter 43 of a photographic camera 44, and the said shutter or cooperating device is intended to be actuated simultaneously, or nearly simultaneously, with the firing of the flashlight cartridge. By the expression "nearly" it is meant that the releasing of the shutter may take place momentarily or a short interval earlier than the firing of the flash-light cartridge, so as to be quite certain that the lens shutter has already opened the instant the cartridge is fired.

The device above described operates as follows:

The device is made ready for firing as described by moving the button or handle 21 downward to set the piston 13 against the compression of its strong spring 14. This of course causes the rod 23 and the piston 24 within the casing part 2 to be similarly moved downward, and the spring 28 will then be compressed as well. Said spring 28, which as before stated is preferably weaker than the spring 14, in its normal position (of Fig. 1) and through or by means of the U-shaped wire 38—or the alternative metal strip 38'—exerted force to compress the spring 37 of the Bowden wire which is still considerably weaker than the said spring 28. But now, when by the downward movement of the button 21, the spring 28 is itself compressed, the spring 37 of the Bowden wire is thereby relieved and no longer compressed and will therefore withdraw the releasing piston 35' into the position of rest shown in Fig. 2. The slight rotation given to piston 12, by moving the button or handle 21 so as to engage its shank 20 in the hold slot part 18, is not communicated to the piston 24 because there is only a loose contact between the rod 23 and said piston 12.

If, the instant when the cartridge is to be fired, a light side pressure (towards the left in Fig. 4) is applied, either by hand or by any deliberate auxiliary means, such as a well known automatic self-timer, in such manner that the shank 20 leaves the slot part 18, then the spring 14 will quickly impel the piston upwardly so that the

firing pin 11 will strike the percussion cap of the cartridge 6 which is thereby fired. Simultaneously, the then released spring 28 causes the two buttons 31, 32 of the Bowden wire to approach each other so that the piston 35' will be projected with a power corresponding to the difference in the forces of the springs 28 and 37 (which latter is at this time compressed), so that the lens shutter or other device to be actuated at the time of firing of the cartridge will be operated. By suitable choice of the strength of the spring 28 the device can be adjusted or regulated so that the piston 35' will not be projected any further than necessary and any damage of sensitive connected parts of the shutter 43 or the like will be prevented.

Having now particularly described the nature and features of my invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a device for firing flashlight cartridges, a cylindrical casing consisting of a plurality of partial casings arranged in axial alignment, means for fixing the flashlight cartridge at one end of the said casing, a piston slidably arranged in the uppermost of the partial casings, a firing pin connected with said piston, a separating wall between said uppermost partial casing and the next connected one, a compression coil spring arranged in the first said partial casing between the piston and said separating wall, a slot in the wall of said uppermost partial casing, a knob having a shank passing through said slot and operatively attached to the aforenamed piston, a second piston slidably arranged in said next connected or second partial casing, a rod rigidly connected with the second piston and extending upwardly through an opening in the separating wall between the two casing parts into loose contact with the first named piston, a plug in the end of said second partial casing opposite to that through which said rod passes, a second compression coil spring arranged in said second partial casing between said plug and said second piston, a Bowden wire having its actuating end enclosed within the successively connected or third partial casing attached to said second one at the end closed by said plug, said Bowden wire comprising an outer tubular shell and an inner bendable wire enclosed by the same, means connecting one end of the outer shell of said wire with the second named piston and serving also to operatively guide the inner wire part thereof slidably therein, and means for connecting the other end of the Bowden wire with the operative mechanism of a camera or other recording device.

2. In a device for firing flashlight cartridges, a cylindrical casing, two separate walls subdividing the casing into three partial casings, means for fixing the flashlight cartridge at one end of the said casing, a spring actuated slidable piston arranged in a partial casing near the said fixing means, a firing pin carried by said piston and adapted to fire the said flashlight cartridge when driven upwardly under spring actuation, means to tension the said spring and to keep it under tension and deliberately release it, a spring actuated piston in the partial casing following the said first partial casing, a rod having a connection between the said two pistons positively influencing the said second piston with expansion of the spring actuating the first piston, a Bowden wire entering with its actuating end into the end of the cylindrical casing, and means to connect the outer shell of the Bowden wire with the said second piston.

3. In a device for firing flashlight cartridges, a cylindrical casing consisting of a plurality of partial casings arranged in alignment, means for fixing the flashlight cartridge at one end of the said casing, a piston slidably arranged in the uppermost of the said partial casings, a firing pin connected with the said piston, a separating wall between said uppermost partial casing and the next following one, a strong compression coil spring arranged in the said partial casing between the said piston and the said separating wall, a slot in the wall of the said uppermost partial casing, a knob having a shank passing through the said slot and being attached to the said piston, a second piston slidably arranged in the said second partial casing, a rod rigidly connected with the said second piston, projecting upwardly through an opening in the said separating wall between the two partial casings and loosely contacting with the said first piston, a plug closing the end of the said second partial casing opposite the end through which the said rod passes, a second compression coil spring arranged in the said second partial casing between the said plug and the second piston, the said second spring being weaker than the said first spring, a third partial casing connected with the said second partial casing at the end closed by the said plug and enclosing the actuating end of the Bowden wire comprising an outer tubular shell and an enclosed bendable inner wire, means to connect the said outer shell with the said second piston, and a lens shutter connected with the other end of the said Bowden wire.

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