

[54] **PHOTOGRAPHIC APPARATUS FOR
USE WITH LIGHT GENERATING
DEVICES WHICH ARE RESPONSIVE
TO MECHANICAL IMPULSES**

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240/1.3; 431/92, 93

[56] **References Cited**

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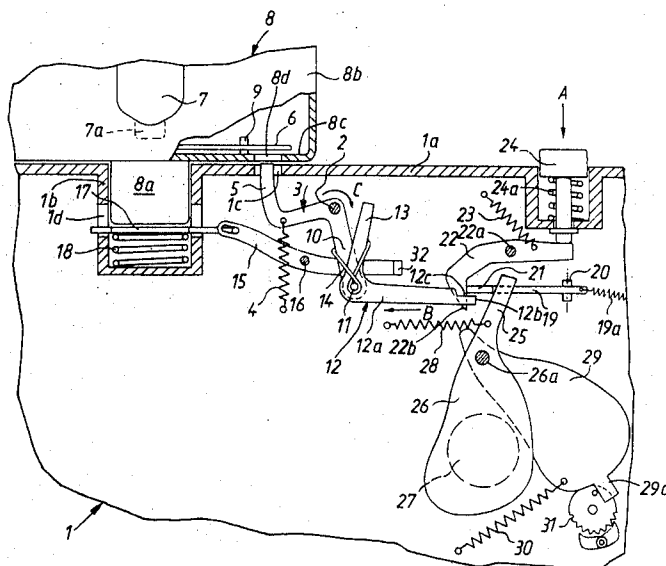
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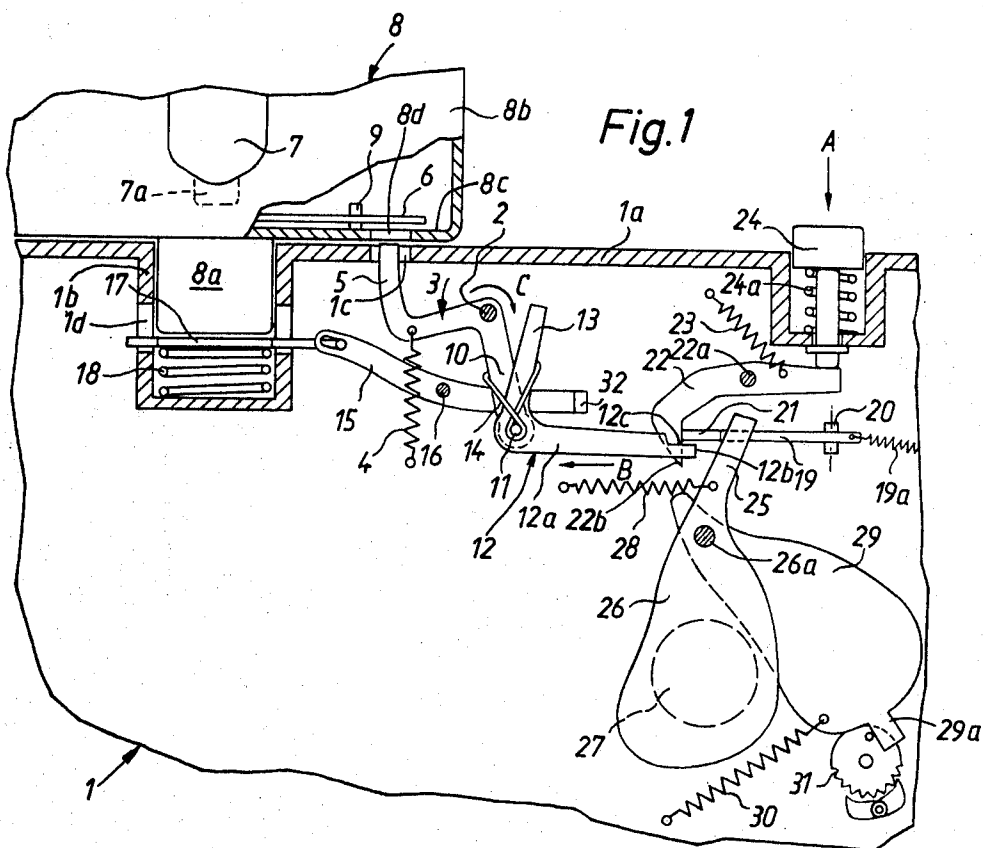
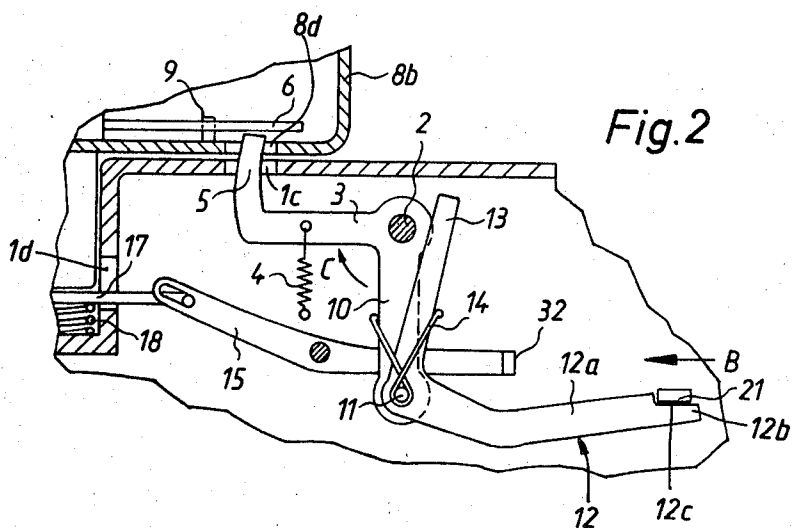
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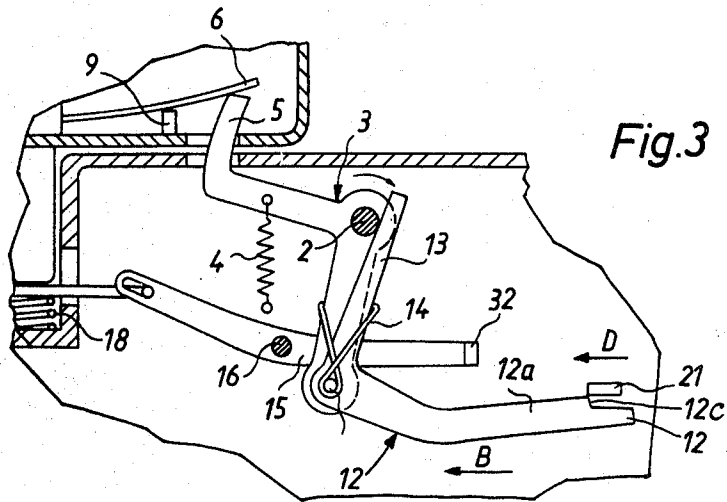
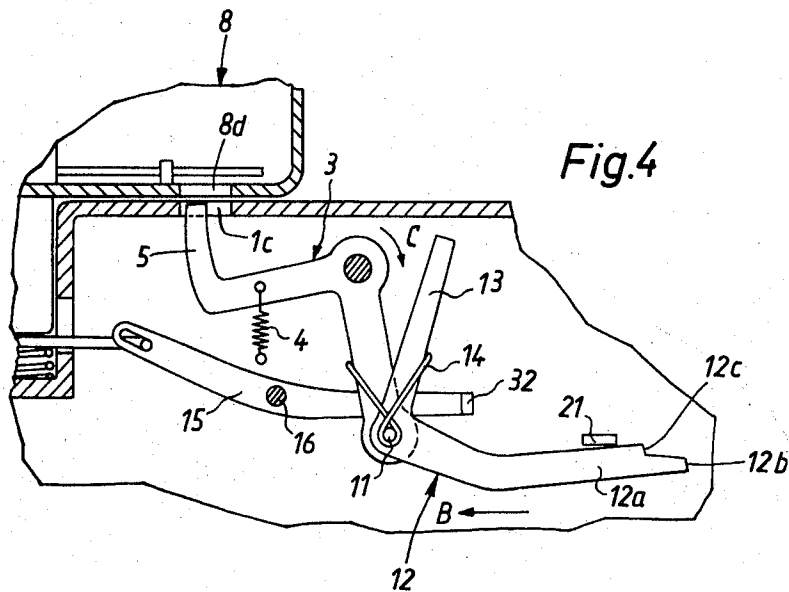
[57] **ABSTRACT**

A still camera for use with detachable flashcubes having lamps which are associated with cartridges responsive to mechanical impulses to fire the associated lamps. The body of the camera supports a horizontal pivot pin for a first two-armed lever one arm of which carries the pivot pin for a second two-armed lever. The second lever can be pivoted with reference to the first lever during the first part of a first stage of movement of an actuating lever from a first to a second position, and the second lever pivots with the first lever during the next-following part of the first stage of movement of the actuating lever whereby the first lever causes an impeller in the flashcube to transmit an impulse to one of the cartridges for firing of a lamp at the exact moment when the actuating member opens the shutter during a second stage of its movement. During such second stage, the actuating lever is disengaged from the second lever so that a spring can retract the first lever to its starting position. A blocking lever in the camera body can disengage the second lever from the actuating lever in response to detachment of the flashcube from the body so that the actuating lever can open the shutter while the first and second levers remain idle.

19 Claims, 5 Drawing Figures





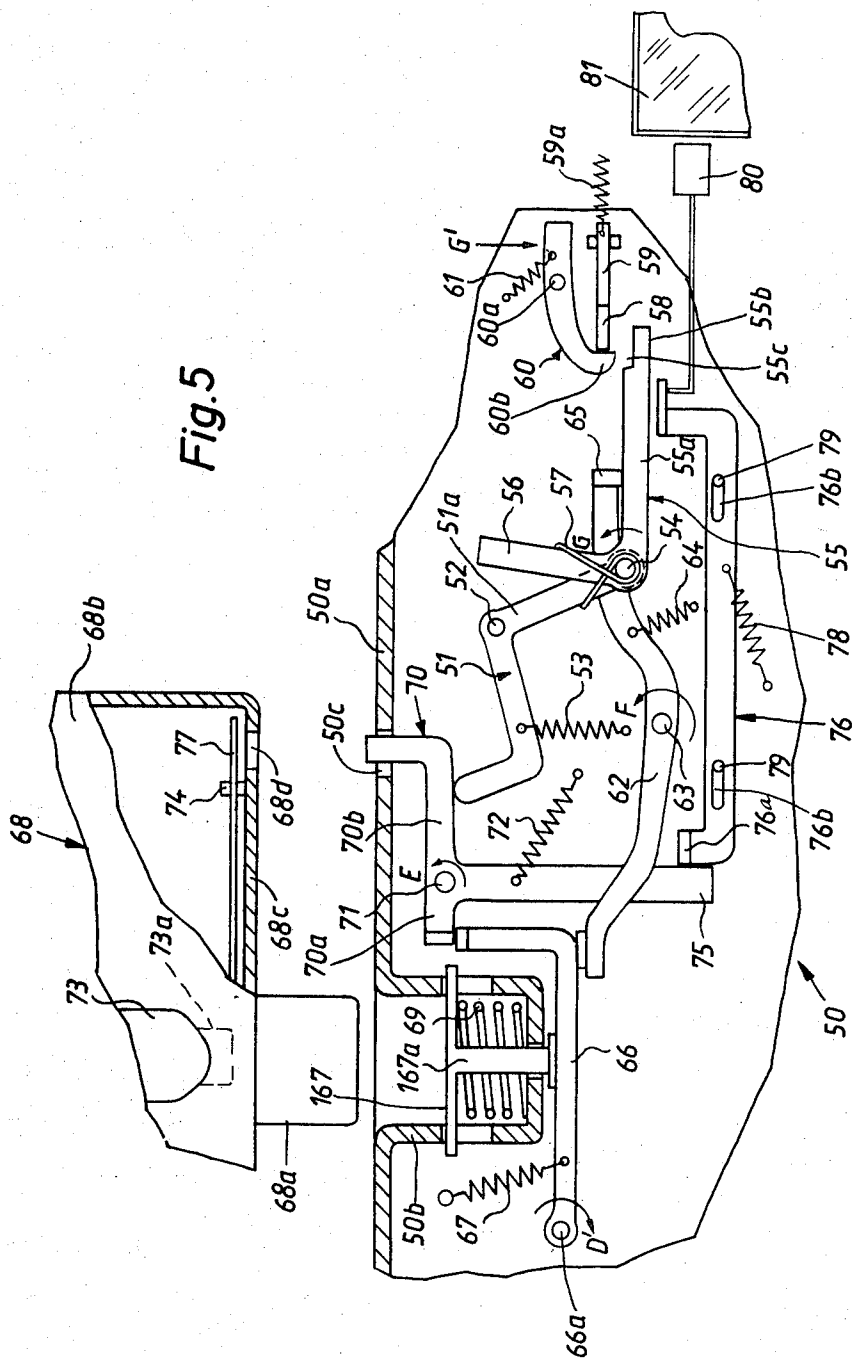


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Fig. 5



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PHOTOGRAPHIC APPARATUS FOR USE WITH LIGHT GENERATING DEVICES WHICH ARE RESPONSIVE TO MECHANICAL IMPULSES

BACKGROUND OF THE INVENTION

The present invention relates to photographic apparatus in general, especially to still cameras, and more particularly to improvements in photographic apparatus which are provided with or are connectable to sources of artificial light, such as flashcubes, electronic flash units or the like. Still more particularly, the invention relates to improvements in photographic apparatus which can be used with light sources of the type wherein a lamp or the like can be fired in response to transmission of a mechanical impact or impulse to a cartridge or the like in the casing of the light source.

It is already known to provide a still camera with a lever which has a pin or the like and a cam face and is mounted in the body of the camera to move its pin into engagement with the firing mechanism of a flashcube in response to movement of an actuating member with reference to the cam face. The lever is biased against the actuating member by a spring but the tip of the lever invariably extends from the camera body when the movement of the actuating member is completed so that the flashcube cannot be readily indexed in order to place a fresh lamp into an optimum position for firing with attendant illumination of a subject or scene. Therefore, the indexing mechanisms for the flashcubes in such cameras must be provided with complicated and costly means for insuring that the flashcube can be indexed in spite of the fact that the tip of the lever extends from the camera body or for removing the tip from the path of the flashcube.

SUMMARY OF THE INVENTION

An object of the invention is to provide a photographic apparatus, particularly a still camera, with novel and improved means for timely operation of a flashcube or another source of artificial light wherein the generation of light takes place in response to transmission of mechanical impulses to cartridges or piezoelectric elements.

Another object of the invention is to provide a photographic apparatus for use with an indexible flashcube of the type wherein the lamps are fired in response to transmission of mechanical impulses to associated operating means, and to construct and assemble the camera in such a way that the mechanism which serves to initiate the transmission of mechanical impulses cannot interfere with the indexing of the flashcube with reference to the body of the apparatus.

A further object of the invention is to provide a photographic apparatus which is capable of invariably initiating the firing of a lamp whenever the flashcube is properly attached to the body of the apparatus and at the exact time when the shutter is open to admit light against an unexposed film frame.

An additional object of the invention is to provide a photographic apparatus with a simple mechanism for releasing impellers which are provided in the flashcube so that the impellers can cause the operating means to fire a lamp whenever the flashcube is properly attached to the body and the user of the apparatus actuates the release element.

Still another object of the invention is to provide an apparatus of the above outlined character with a simple, compact, rugged, reliable and long-lasting mechanism for initiating the firing of lamps in flashcubes wherein the firing of lamps necessitates the transmission of relatively strong mechanical impulses.

The invention is embodied in a photographic apparatus which comprises a housing or body, a source of artificial light (such as an indexible flashcube) supported by the housing and including one or more lamps or analogous light generating means and operating means (e.g., firing cartridges or piezoelectric elements) for the light generating means, the operating means being responsive to mechanical impulses to thereby operate the light generating means, a first member (preferably a two-armed lever) which is mounted in the housing for pivotal movement from a starting position in a first direction to assume a predetermined position and to thus initiate the transmission of an impulse to the operating means of the light source and in a second direction back toward the starting position in which the first member does not interfere with movements of the light source with reference to the housing, a second member (preferably a second two-armed lever) articulately coupled to the first member, means for biasing the first member in the second direction, and actuating means movable from a first or cocked position to a second or uncocked position to thereby move the first member from the starting position by way of the second member during a first stage of its movement to the second position so that the first member assumes its predetermined position. The actuating means bypasses the second member during a second stage of its movement toward the second position so that the biasing means can return the first member to its starting position.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The improved photographic apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary longitudinal vertical sectional view of a photographic apparatus which embodies one form of the invention and whose housing is separably connected with a flashcube having lamps which can be fired in response to transmission of mechanical impulses to cartridges provided therefor in the flashcube;

FIG. 2 illustrates a detail in the apparatus of FIG. 1 with the first and second members shown in intermediate positions prior to transmission of an impact to a cartridge in the flashcube;

FIG. 3 illustrates the structure of FIG. 2 with the first member shown in a predetermined position in which it initiates the transmission of an impulse to a cartridge in the flashcube;

FIG. 4 illustrates the structure of FIG. 2 or 3 with the first member shown again in its starting position; and

FIG. 5 is a fragmentary longitudinal vertical sectional view of a modified camera wherein the first member

causes a third member to initiate the transmission of an impulse to a selected cartridge in the flashcube, the latter being shown in detached position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 1 to 4, there is shown a portion of a still camera having a housing or body 1 which includes a top wall 1a. The top wall 1a is provided with a socket 1b for reception of the base or foot 8a of an indexible source 8 of artificial light. The illustrated light source 8 is a flashcube having four equidistant light generating lamps 7 (only one shown) each of which can be fired by a discrete operating means or cartridge 7a in response to reception of a mechanical impact or impulse from an impeller 6 which is held in cocked or stressed position by a stop 9. The casing 8b of the light source 8 contains four impellers 6 and four discrete stops 9, one for each impeller. The bottom panel 8c of the casing 8b has four openings 8d, one for each of the four impellers 6 and positioned in such a way that one opening 8d registers with an opening 1c in the top wall 1a whenever the light source 8 assumes one of four predetermined positions in each of which a different lamp 7 faces the subject, i.e., in each of which a different lamp 7 is in an optimum position for illumination of the subject or scene which can be seen through the viewfinder (see the part 81 of FIG. 5).

The means for lifting the impellers 6 above the associated stops 9 so that the impellers can strike against the corresponding cartridges 7a in order to fire the lamps 7 comprises a first or disengaging lever 3 which is pivotable on a horizontal pin 2 fixedly mounted in the housing 1 below the top wall 1a. A helical spring 4 biases the disengaging lever 3 in a counterclockwise direction, as viewed in FIG. 1, so that it tends to withdraw the arm 5 of the lever 4 from the opening 1c of the top wall 1a. A second arm 10 of the disengaging lever 3 carries a pivot pin 11 for a second or control lever 12 having arms 12a and 13. The arm 13 can abut against the pivot pin 2 in response to sidewise movement of the lever 12 in the direction indicated by the arrow B. A torsion spring 14 is convoluted around the pivot pin 11 and its legs engage the arms 10 and 13 in such a way that the control lever 12 tends to pivot in a counterclockwise direction, as viewed in FIG. 1. The reference character 15 denotes a blocking lever which is mounted in the housing 1 for pivotal movement about the axis of a horizontal pin 16 and is biased in a clockwise direction, as viewed in FIG. 1, by a helical spring 18 mounted in the lowermost or innermost part of the socket 1b. The spring 18 can pivot the blocking lever 15 through the intermediary of a motion transmitting plate 17 having lugs which are guided in slots 1d of the socket 1b. One lug of the plate 17 is articulately coupled to the left-hand arm of the blocking lever 15. The right-hand arm of the lever 15 has a projection 32 which engages the arm 12a of the control lever 12 and prevents the latter from pivoting the disengaging lever 3 in a clockwise direction when the spring 18 is free to expand. When the base or foot 8a of a light source 8 is properly inserted into and withdrawably held in the socket 1b, it maintains the motion transmitting plate 17 in the illustrated depressed position in which the spring 18 stores energy. The projection 32 of the blocking

lever 15 is then remote from the arm 12a and allows the control lever 12 to pivot the disengaging lever 3 in a clockwise direction in order to effect a disengagement of the illustrated impeller 6 from the adjacent stop 9.

The means for moving the control lever 12 for the purpose of initiating the firing of a lamp 7 comprises actuating lever 19 which is mounted in the housing 1 for pivotal movement about the axis of a vertical shaft 20 and has a portion or moving means 21 which engages a suitably configured tooth or projection 12b at the free end of the arm 12a to maintain the disengaging lever 3 and the control lever 12 in the starting positions of FIG. 1. The torsion spring 14 reacts against the lever 3 and biases the arm 12a of the lever against the portion 21. The actuating lever 19 is held in the first or cocked position of FIG. 1 by a retaining lever 22 which is pivotable on a horizontal pin 22a and is biased in a counterclockwise direction by a helical spring 23. The pallet 22b of the retaining lever 22 extends into the path of movement of the actuating lever 19 from the cocked or first position of FIG. 1 to thereby insure that the portion 21 of the actuating lever 19 holds the control lever 12 in the starting position by engaging the tooth 12b. The retaining lever 22 can be pivoted against the opposition of the spring 23 in response to depression of a release knob 24 which is biased to the illustrated idle position by a return spring 24a and has a head which is accessible at the exposed side of the top wall 1a to be depressed in the direction indicated by the arrow A whenever the user of the camera wishes to make an exposure.

A spring 19a biases the actuating lever 19 from the cocked or first position of FIG. 1; this spring causes to store a substantial amount of energy when the lever 19 is returned to the cocked position of FIG. 1, for example, in response to actuation of the film transporting mechanism (not shown) for the purpose of advancing the film by the length of a frame.

The portion 21 (or another portion) of the actuating lever 19 further serves as an arresting means for the extension 25 of a leading shutter blade 26 which is pivotable in the housing 1 on a horizontal shaft 26a and is biased by a spring 28 which urges the extension 25 against the portion 21. The leading shutter blade 26 normally overlies a light-admitting apertures 27 which is located behind the picture taking lens and in front of the foremost unexposed film frame. A second or trailing shutter blade 29 is also pivotable on the shaft 26a and is biased to its sealing position by a spring 30. The spring 30 can move the trailing blade 29 to sealing position (in which the blade 29 overlies the light-admitting opening 27) with a delay which is determined by an adjustable retard mechanism 31 of the shutter.

The operation:

It is assumed that the foot or base 8a of a fresh flashcube 8 is properly inserted into and retained in the socket 1b of the top wall 1a so that the motion transmitting plate 17 stresses the spring 18 and the blocking lever 15 maintains its projection 32 at a level above and spaced from the arm 12a of the control lever 12. The flashcube 8 is attached to the housing 1 in such angular position that one of the four openings 8d in the bottom panel 8c of the casing 8b registers with the opening 1c of the top wall 1a. The spring 4 maintains the arm 5 of the disengaging lever 3 in the starting position of FIG. 1

in which the tip of the arm 5 does not extend beyond the upper side of the top wall 1a. The tooth 12b at the free end of the arm 12a of the control lever 12 bears against the portion 21 of the actuating lever 19 which is held by lever 22 in the cocked or first position of FIG. 5 so that the spring 19a stores energy.

If the user wishes to make an exposure with artificial illumination of the subject, the release knob 24 is depressed in the direction indicated by the arrow A so as to pivot the retaining lever 22 in a clockwise direction against the opposition of the spring 23. The pallet 22b of the retaining lever 22 is disengaged from the portion 21 of the actuating lever 19 so that the latter is free to turn on the shaft 20 under the action of the spring 19a.

As the actuating lever 19 pivots under the action of the spring 19a, its portion 21 pushes the arm 12a of the control lever 12 in the direction indicated by the arrow B. Such movement of the arm 12a under the action of the spring 19a brings about a pivotal movement of the disengaging lever 3 against the opposition of the spring 4 (see the arrow C in FIG. 1). As the arm 12a moves in the direction indicated by the arrow B and the disengaging lever 3 simultaneously pivots about the axis of the pivot pin 2 (arrow C), the arm 13 approaches and finally abuts against the pivot pin 2. The arm 13 and/or the arresting portion or abutment of the pivot pin 2 for the arm 13 is preferably adjustable so as to insure that the arm 13 will strike against the pin 2 in a predetermined angular position of the disengaging lever 3.

As the actuating member 19 turns on the shaft 20 under the action of the spring 19a, the spring 28 pivots the leading shutter blade 26 towards its open position to expose the light-admitting aperture 27 because the extension 25 of the blade 26 is caused to bear against the portion 21 of the actuating lever 19. FIG. 2 shows the arm 13 of the control lever 12 in a position close to abutment with the pivot pin 2. It will be seen that the spring 4 is partly expanded because the tip of the arm 5 extends through the opening 1c and into and through the registering opening 8d so that it is adjacent to the illustrated impeller 6. The latter continues to abut against the associated stop 9.

As shown in FIG. 3, the actuating lever 19 can move its portion 21 (arrow D) beyond the position of FIG. 2 so that the portion 21 causes the arm 12a to continue its movement in the direction indicated by the arrow B (after the arm 13 moves into abutment with the pivot pin 2). Therefore, the control lever 12 pivots the disengaging lever 3 in a clockwise direction, as viewed in FIG. 3, whereby the arm 5 disengages the impeller 6 from the stop 9 and the impeller 6 is free to transmit an impact to the adjacent cartridge 7a (FIG. 1) which fires the respective lamp 7 at a time when the shutter is open, i.e., when the blade 26 exposes the light-admitting aperture 27.

The portion 21 of the actuating lever 19 leaves the notch 12c of the arm 12a after the arm 5 disengages the impeller 6 from the stop 9 whereby the spring 4 is free to contract (see FIG. 4) and withdraws the arm 5 from the openings 1c and 8d so that the flashcube 8 can be readily indexed to a different angular position without any interference on the part of the disengaging lever 3. Such pivotal movement of the disengaging lever 3 under the action of the spring 4 causes the control lever

12 to move its arm 12a counter to the direction indicated by the arrow B. The torsion spring 14 biases the control lever 12 in a counterclockwise direction, as viewed in FIG. 4, so that the upper edge face of the arm 12a bears against the portion 21 of the actuating lever 19 when the latter dwells in the uncocked or second position of FIG. 4.

The shutter is closed automatically after the elapse of an interval which is determined by the setting of the retard mechanism 31. As soon as the mechanism 31 releases the projection 29a of the trailing shutter blade 29, the latter pivots on the shaft 26a under the action of the spring 30 and overlies the light-admitting aperture 27 to terminate the admission of light to that film frame which is located behind the picture taking objective.

The next exposure can be made after the actuating lever 19 is returned to the cocked or first position of FIG. 1 by pivoting counter to the direction indicated by the arrow D. Such pivotal movement of the actuating lever 19 results in a return movement of the leading shutter blade 26 to the sealing position of FIG. 1 because the portion 21 bears against the projection 25 and causes the blade 26 to pivot against the opposition of the spring 28 while the actuating lever 19 stresses the spring 19a. The pivotal movement of the actuating lever 19 to its cocked or first position can be effected by the film transporting mechanism. As soon as the actuating lever 19 reassumes the cocked position of FIG. 1, its portion 21 engages the tooth 12b on the arm 12a and holds the control lever 12 in the starting position of FIG. 1. Also, the retaining lever 22 is free to pivot under the action of its spring 23 and the pallet 22b engages the portion 21 to lock the actuating lever 19 in the cocked position of FIG. 1.

If the socket 1b is empty, i.e., if the base or foot 8a of the flashcube 8 is withdrawn, the spring 18 expands and causes the motion transmitting plate 17 to pivot the blocking lever 15 in a clockwise direction, as viewed in FIG. 1. The projection 32 of the blocking lever 15 engages the arm 12a and pivots the control lever 12 in a clockwise direction so as to disengage the tooth 12b from the portion 21 of the actuating lever 19. Therefore, the actuating lever 19 is unable to effect a movement of the arm 5 to the predetermined position of FIG. 3 in which the arm 5 extends beyond the opening 1c of the top wall 1a and disengages the impeller 6 from the stop 9.

The base or foot 8a of a properly inserted flashcube 8 can be indexed through 90 degrees or through a whole multiple of 90 degrees in response to actuation of the film transporting mechanism to advance the film by the length of a frame. The manner in which the film transporting mechanism can index a flashcube is known in the art; therefore, such mechanism and its connection with the base or foot 8a are not shown in FIGS. 1 to 4.

An important advantage of the structure shown in FIGS. 1 to 4 is that the arm 5 of the disengaging lever 3 extends beyond the top wall 1a of the housing 1 for a relatively short interval of time, namely, during the first stage of movement of the actuating lever 19 from its first or cocked position of FIG. 1 to the second or uncocked position of FIG. 4 in which the portion 21 continues to engage the notch 12c of the arm 12a. The disengaging lever 3 is thereupon automatically retracted to the starting position of FIG. 1 under the action of the

spring 4 so that it cannot interfere with the indexing of flashcube 8 to a different position. By proper dimensioning of the levers 3, 12, each impeller 6 can be disengaged from the respective stop 9 in response to exertion of a relatively small force. The arm 13 of the control lever 12 moves toward the pivot pin 2 for the disengaging lever 3 during the first part of the first stage of movement of the actuating lever 19 toward its second position. During the second part of such first stage, the levers 3 and 12 pivot as a unit so as to move the lever 3 to the predetermined position of FIG. 3 in which the arm 5 disengages the impeller 6 from the stop 9. The actuating lever 19 then continues to move toward its second position but without pivoting the control lever 12 so that the spring 4 can retract the disengaging lever 3 to the starting position of FIG. 1.

It is clear that the housing 1 can be provided with a separate abutment for the arm 13 of the control lever 12. However, the construction shown in FIG. 1 is preferred at this time because the member 2 can perform the dual function of pivot means for the control lever 3 and of an abutment for the arm 13.

If desired, the camera can be provided with a fixed cam, not shown, which disengages the control lever 12 from the actuating lever 19 while the latter performs the second part of the first stage of its movement from the cocked position of FIG. 1 or while the actuating lever 19 begins the second stage of its movement toward the uncocked position of FIG. 4.

FIG. 5 illustrates a portion of a modified still camera having a housing 50 including a top wall 50a provided with an opening 50c. A first or disengaging lever 51 is pivotable in the housing 50 about the axis of a horizontal pivot pin 52 and is biased in a counterclockwise direction by a helical spring 53. The arm 51a of the disengaging lever 51 carries a pivot pin 54 for a second or control lever 55 having a first arm 55a and a second arm 56. A torsion spring 57 which is convoluted around the pivot pin 54 engages the arms 51a, 56 so as to bias the control lever 55 in a counterclockwise direction, as viewed in FIG. 5. An actuating lever 59 is biased by a spring 59a and has a portion or moving means 58 which is normally engaged by the pallet 60b of a retaining lever 60 which is pivotable on a horizontal pin 60a and is biased in a counterclockwise direction by a helical spring 61. The release knob (not shown) must be depressed in the direction indicated by the arrow G' in order to disengage the pallet 60b from the portion 58 of the actuating lever 59. FIG. 5 shows the actuating lever 59 in its first or cocked position in which the spring 59a stores energy and the portion 58 bears against the pallet 60b.

A two-armed blocking lever 62 is pivotable in the housing 50 about the axis of a horizontal pin 63 and is biased in a clockwise direction by a helical spring 64. The projection 65 at the free end of the right-hand arm of the blocking lever 62 engages the arm 55a of the control lever 55 and maintains the tooth 55b of the arm 55a at a level below the portion 58 of the actuating lever 59. The projection 65 is free to assume such operative position because the base or foot 68a of the flashcube 68 is withdrawn from the socket 50b of the top wall 50a. Thus, the spring 69 is free to expand and maintains the motion transmitting plate 167 in its raised position. A stem 167a of the plate 167 abuts

against a motion transmitting lever 66 which is pivotable on a horizontal pin 66a of the housing 50 and is biased in a counterclockwise direction by a helical spring 67. The left-hand arm of the blocking lever 62 is biased against the motion transmitting lever 66 by the spring 64 and, since the motion transmitting plate 167 is held in the raised position by the spring 69, the projection 65 is caused by spring 64 to assume the operative position of FIG. 5.

A three-armed third lever 70 is pivotable in the housing 50 on a horizontal pin 71 and is biased in a counterclockwise direction by a helical spring 72. The arm 70a of the third lever 70 abuts against the free end portion of the motion transmitting lever 66; a second arm 70b of the lever 70 extends in part through the opening 50c in the top wall 50a; and a third arm 75 of the lever 70 abuts against one end portion 76a of a reciprocable slide 76. The slide 76 has two parallel elongated slots 76b for fixed guide pins 79. A spring 78 biases the slide 76 in a direction to the left, as viewed in FIG. 5.

The flashcube 68 has a casing 68b containing four equidistant lamps 73, four impellers 77 and four stops 74. The bottom panel 68c of the casing 68b is provided with four openings 68d, one for each impeller 77.

The operation of the structure shown in FIG. 5 is as follows:

If the user of the still camera wishes to make an exposure without flash, i.e., if the foot or base 68a of the flashcube 68 is not inserted into the socket 50b of the top wall 50a, the projection 65 of the blocking lever 62 maintains the arm 55a of the control lever 55 away from the path of the portion 58 of the actuating member 59. Thus, if the user depresses the release knob in the direction indicated by the arrow G', the retaining lever 60 moves its pallet 60b away from the portion 58 so that the spring 59a can contract and moves the actuating lever 59 from the illustrated first or cocked position. The portion 58 then moves the leading shutter blade to the open position in the same way as described for the portion 21 and shutter blade 26 of FIG. 1. The trailing shutter blade moves to its sealing position with a predetermined delay to thus complete the exposure of a film frame to scene light.

If the exposure is to be made with artificial illumination of the subject, the user inserts the foot or base 68a into the socket 50b so that the foot 68a depresses the motion transmitting plate 167 and stresses the spring 69. At the same time, the shank or stem 167a of the plate 167 pivots the motion transmitting lever 66 in a clockwise direction as indicated by the arrow D'. The motion transmitting lever 66 pivots the blocking lever 62 in a counterclockwise direction (arrow F) whereby the projection 65 moves upwardly and permits the tooth 55b on the arm 55a of the control lever 55 to engage the portion 58 of the cocked actuating lever 59. This is due to the provision of the torsion spring 57 which biases the control lever 55 in a counterclockwise direction (arrow G). As the motion transmitting lever 66 pivots in the direction indicated by the arrow D', the spring 72 is free to pivot the third lever 70 in a counterclockwise direction (arrow E) to such an extent that the upwardly extending portion of the arm 70b engages the adjacent impeller 77 but the latter continues to bear against the respective stop 74, i.e., the lamp 73 is not fired in response to attachment of the flashcube 68

to the housing 50. The arm 75 of the third lever 70 pushes the slide 76 in a direction to the right, as viewed in FIG. 5, whereby the slide 76 moves an indicator (e.g., a flag 80) into the viewfinder window 81. The spring 78 insures that the left-hand end portion 76a of the slide 76 continues to bear against the arm 75 of the third lever 70. The extent of movement of the arm 75 in a counterclockwise direction (arrow E) in response to insertion of a flashcube 68 with four fired lamps 73 (or with at least one fired lamp 73 which is positioned in such a way that the associated impeller 77 is located above the opening 50c) exceeds the extent of movement of the arm 75 when the arm 70b engages an impeller 77 which still abuts against the associated stop 74. This causes the flag 80 to move out of the viewfinder window 81 or to assume in the viewfinder window a position which indicates to the user that the lamp 73 which faces the subject has been fired. If desired, the slide 76 can serve as a carrier for two discrete flags one of which (e.g., the illustrated flag 80) appears in the viewfinder window 81 when the arm 70b engages an impeller 77 which still abuts against the associated stop 74 (to thus indicate that an unfired lamp 73 of the properly attached flashcube 68 faces the subject), and the other of which appears in the viewfinder window 81 when the arm 70b is free to abut against an impeller 77 which has been disengaged from the associated stop 74 to thus indicate to the user that the lamp 73 which faces the subject has been fired, i.e., that the camera is not ready to make an exposure with artificial illumination of the subject.

It is clear that the window 81 can constitute a separate window which is provided in the housing 50 in addition to the window of the viewfinder.

The exposure with artificial illumination of the subject is thereupon started by depressing the release knob in the direction indicated by the arrow G'. The pallet 60b of the retaining lever 60 is disengaged from the portion 58 of the actuating lever 59 so that the latter begins to turn under the action of the spring 59a. The portion 58 pushes the control lever 55 in a direction to the left so that the arm 56 moves toward abutment with the pivot pin 52. Further leftward movement of the arm 55a under the action of the portion 58 then causes the disengaging lever 51 to pivot in a clockwise direction, as viewed in FIG. 5, and to cause the arm 70b of the third lever 70 to disengage the adjacent impeller 77 from the associated stop 74. The impeller 77 transmits an impact to the cartridge 73a and causes the latter to fire the lamp 73 while the shutter is open, i.e., while the leading shutter blade is held in open position by the portion 58 and while the trailing shutter blade continues to dwell in its open position.

The flag 80 changes its position with reference to the window 81 when the arm 70b is retracted into the housing 50 under the action of the spring 78 to thus indicate to the user that the lamp 73 which faces the subject has been fired. The retraction of arm 70b into the housing 50 (to thus permit unimpeded indexing of the flashcube 68 by the film transporting mechanism, in response to return movement of the actuating lever 59 to its cocked or first position, or by hand) can take place when the portion 58 of the actuating lever 59 moves beyond the notch 55c in the arm 55a because the spring 53 is then free to contract and the disengaging lever 51 does not

oppose a clockwise pivotal movement of the third lever 70 by the spring 78 and slide 76.

All other operations take place in a manner as described in connection with FIGS. 1 to 4.

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

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. In a photographic apparatus, a combination comprising a housing; a source of artificial light supported by said housing and including light generating means and operating means for said light generating means, said operating means being responsive to mechanical impulses to thereby operate said light generating means; a first member mounted in said housing for pivotal movement from a starting position in a first direction to assume a predetermined position and to thus initiate the transmission of an impulse to said operating means and in a second direction back toward said starting position; a second member articulately coupled to said first member; means for biasing said first member in said second direction; and actuating means movable from a first position to a second position and having means for moving said first member from said starting position by way of said second member during a first stage of movement of said actuating means to said second position so that said first member assumes said predetermined position, said moving means being arranged to bypass said second member during a second stage of movement of said actuating means to said second position so that said biasing means can move said first member from said predetermined position.

2. A combination as defined in claim 1, wherein said first and second members are levers and said first member is pivotable in said housing about a fixed axis.

3. A combination as defined in claim 1, wherein said second member has an arm and further comprising abutment means provided in said housing for said arm, said moving means of said actuating means being arranged to move said second member with reference to said first member and to thereby move said arm toward engagement with said abutment means during a first portion of said first stage and to pivot said first and second members in unison during the remaining portion of said first stage of movement of said actuating means to said second position.

4. A combination as defined in claim 3, further comprising means for biasing said second member against said moving means of said actuating means during said first stage of movement of said actuating means, said actuating means being movable from said second position back to said first position thereof and said last mentioned biasing means being arranged to urge said second member against said moving means of said actuating means not later than when said actuating means reassumes said first position thereof.

5. A combination as defined in claim 3, further comprising means for biasing said second member against said moving means of said actuating means during said first stage of movement of said actuating means.

6. A combination as defined in claim 5, wherein said last mentioned biasing means reacts against said first member.

7. A combination as defined in claim 1, further comprising stationary cam means provided in said housing to disengage said second member from said actuating means during said second stage of movement of said actuating means.

8. A combination as defined in claim 1, wherein said actuating means is pivotable between said first and second positions about an axis which is at least substantially normal to the pivot axis of said first member.

9. A combination as defined in claim 1, further comprising normally closed shutter means, said actuating means being arranged to open said shutter means in response to movement from said first to said second position thereof.

10. A combination as defined in claim 1, further comprising means for indicating the positions of said first member.

11. A combination as defined in claim 1, wherein said light generating means includes at least one lamp and said operating means comprises a cartridge for firing said lamp in response to reception of a mechanical impact, said source further comprising normally cocked impeller means and stop means for maintaining said impeller means in the cocked position thereof, said first member being arranged to effect the disengagement of said impeller means from said stop means in response to movement to said predetermined position so that said impeller means can transmit an impact to said cartridge.

12. A combination as defined in claim 1, wherein each of said members is a two-armed lever and said second member is pivotably supported by one arm of said first member.

13. A combination as defined in claim 1, further comprising retaining means for releasably holding said actuating means in said first position thereof and release means operable to disengage said retaining means from said actuating means.

14. In a photographic apparatus, a combination comprising a housing; a source of artificial light supported by said housing and including light generating means and operating means for said light generating means, said operating means being responsive to mechanical impulses to thereby operate said light generating means; a first member mounted in said housing for pivotal movement from a starting position in a first direction to assume a predetermined position and to thus initiate the transmission of an impulse to said operating means and in a second direction back toward said starting position; a second member articulately coupled to said first member and having an arm; abutment means provided in said housing for said arm, said abutment means defining a pivot axis for said first member; means for biasing said first member in said second direction; and actuating means movable from a first position to a second position to thereby move said first member from said starting position by way of said second member during a first stage of its movement to

said second position so that said first member assumes said predetermined position, and to bypass said second member during a second stage of said movement so that said biasing means can move said first member from said predetermined position, said actuating means being arranged to move said second member with reference to said first member and to thereby move said arm toward engagement with said abutment means during a first portion of said first stage and to pivot said first and second members in unison during the remaining portion of said first stage.

15. In a photographic apparatus, a combination comprising a housing; a source of artificial light supported by and separably attached to said housing and including light generating means and operating means for said light generating means, said operating means being responsive to mechanical impulses to thereby operate said light generating means; a first member mounted in said housing for pivotal movement from a starting position in a first direction to assume a predetermined position and to thus initiate the transmission of an impulse to said operating means and in a second direction back toward said starting position; a second member articulately coupled to said first member; means for biasing said first member in said second direction; actuating means movable from a first position to a second position to thereby move said first member from said starting position by way of said second member during a first stage of its movement to said second position so that said first member assumes said predetermined position, and to bypass said second member during a second stage of said movement so that said biasing means can move said first member from said predetermined position; and blocking means movably mounted in said housing for movement to a predetermined position in response to separation of said source from said housing to thereby disengage said second member from said actuating means in the first position of said actuating means so that the actuating means can bypass said second member during movement from said first position thereof.

16. A combination as defined in claim 15, further comprising motion transmitting means movably mounted in said housing to disengage said blocking means from said second member in response to attachment of said source to said housing.

17. In a photographic apparatus, a combination comprising a housing; a source of artificial light supported by and separably attached to said housing and including light generating means and operating means for said light generating means, said operating means being responsive to mechanical impulses to thereby operate said light generating means; a first member mounted in said housing for pivotal movement from a starting position in a first direction to assume a predetermined position and to thus initiate the transmission of an impulse to said operating means and in a second direction back toward said starting position; a second member articulately coupled to said first member; means for biasing said first member in said second direction; actuating means movable from a first position to a second position to thereby move said first member from said starting position by way of said second member during a first stage of its movement to said second position so that the first member assumes said predetermined posi-

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tion, and to bypass said second member during a second stage of said movement so that said biasing means can move said first member from said predetermined position; a third member pivotably mounted in said housing and responsive to movement of said first member from said starting to said predetermined position to thereby effect the transmission of an impulse to said operating means; and motion transmitting means movably mounted in said housing and arranged to move said third member, in response to attachment of said source to said housing, to a position in which said third member engages impeller means provided in said

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source for said operating means.

18. A combination as defined in claim 17, wherein said first member is a lever having an arm which abuts against said third member in said starting position of said first member.

19. A combination as defined in claim 18, wherein said third member is a lever having a first arm receiving motion by way of said motion transmitting means and a second arm engaging said arm of said first mentioned lever.

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