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Burgarella et al.

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[54] **CONTROL SYSTEM FOR PHOTOGRAPHIC APPARATUS**

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[73] Assignee: **Polaroid Corporation,** Cambridge, Mass.

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[21] Appl. No.: **213,317**

[52] **U.S. Cl.** ..... **95/11 R,** 95/14, 95/31 EL, 95/42, 95/53 EA

[51] **Int. Cl.** **G03b 17/53,** G03b 19/12

[58] **Field of Search** ..... 95/11 R, 13, 14, 95/31 EL, 19, 39, 42, 53 EA

[56] **References Cited**

UNITED STATES PATENTS

2,705,907	4/1955	Caps et al.	95/14
3,487,759	1/1970	Fahlenberg	95/53 EA
2,759,404	8/1956	Bishop et al.	93/31 EL
1,963,107	6/1934	Walters	95/42

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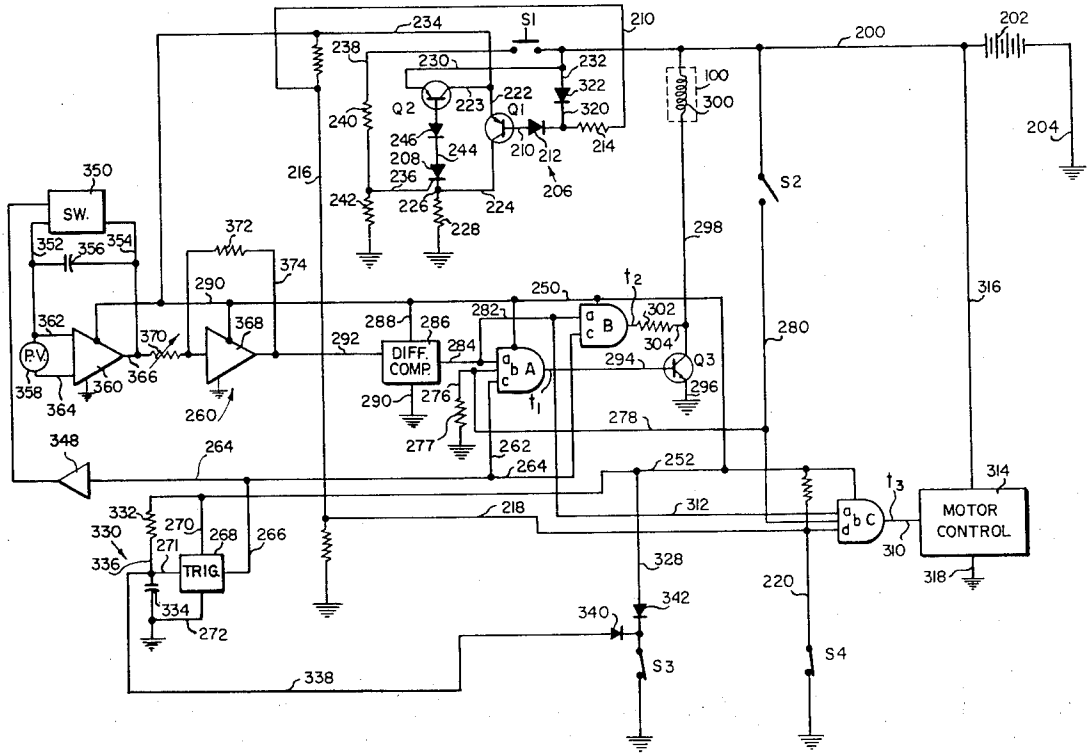
[57] **ABSTRACT**

Photographic apparatus and a control system therefore which functions to carry out a series of operational events in response to the temporary, manual depression of a start switch. The control system incorporates an electronic latch which is activated only after select initial ones of these operational events are carried out. Additionally, the control system incorporates a feature preventing an unwanted repetition of photographic cycles as a consequence of inadvertant continued depression of the start switch before and beyond the termination of a given photographic cycle.

34 Claims, 6 Drawing Figures



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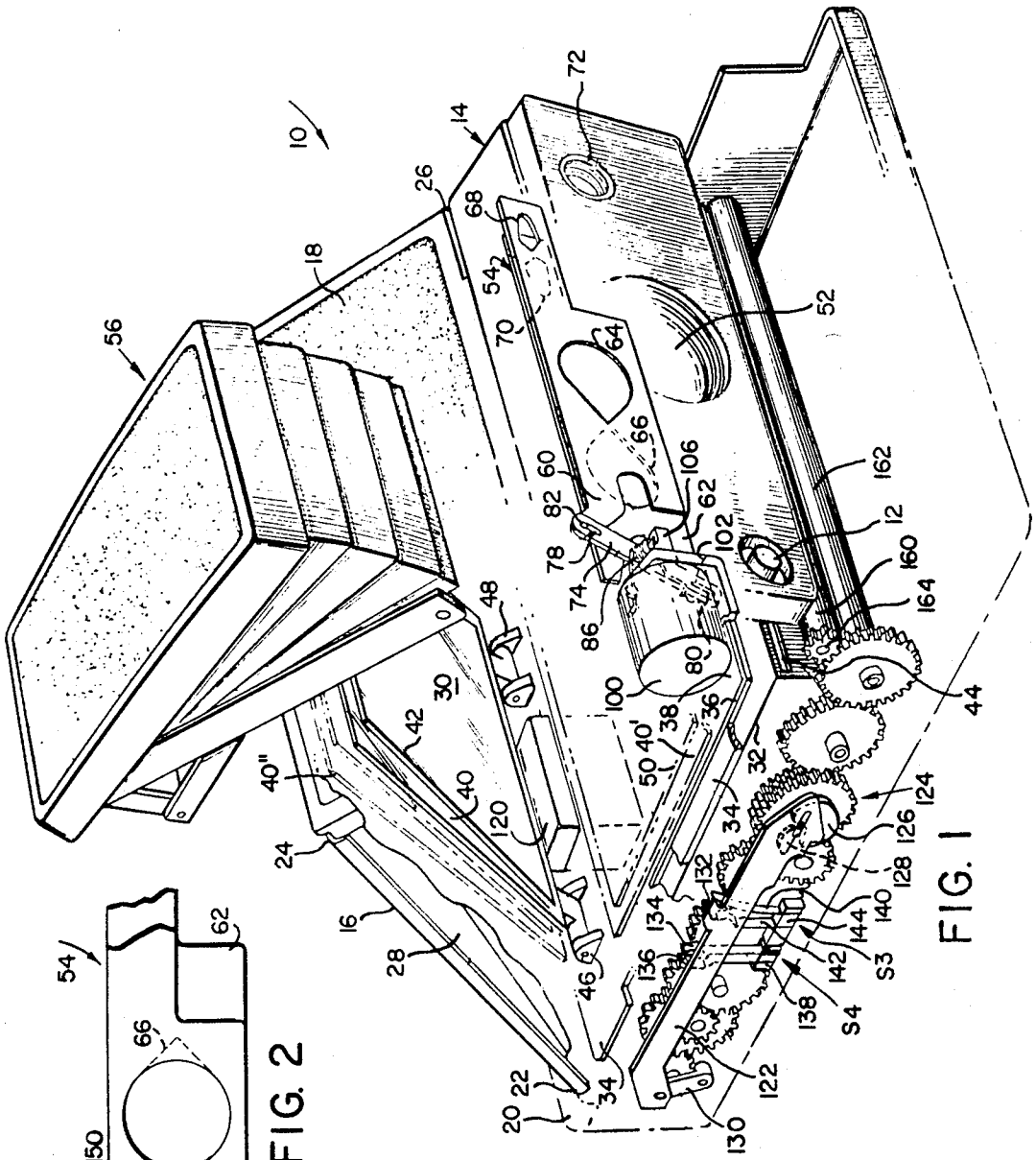

FIG. 1

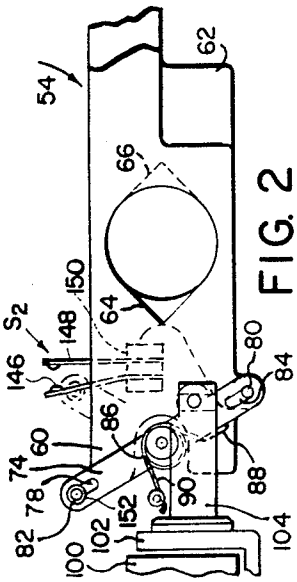

FIG. 2

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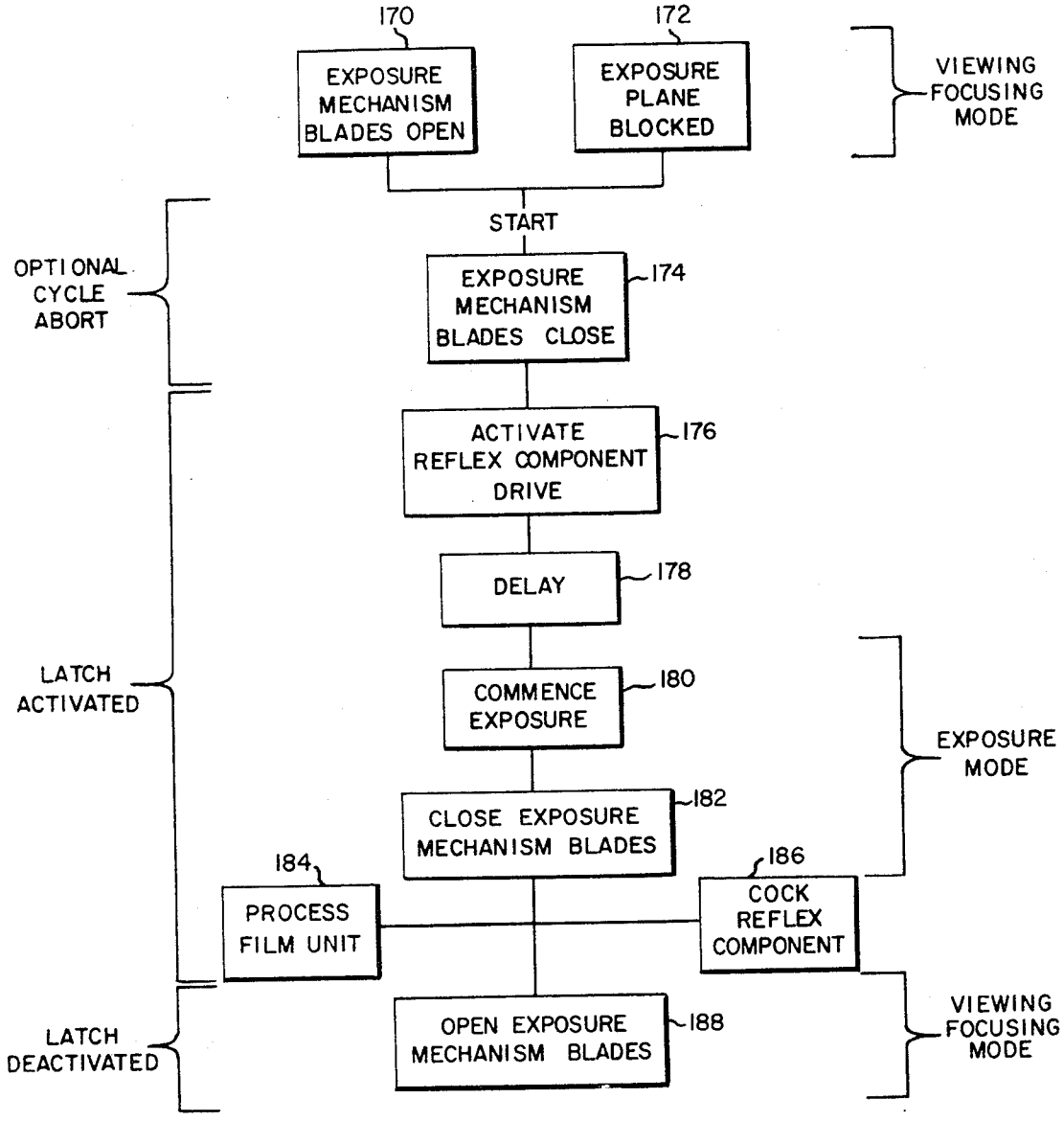

FIG. 3

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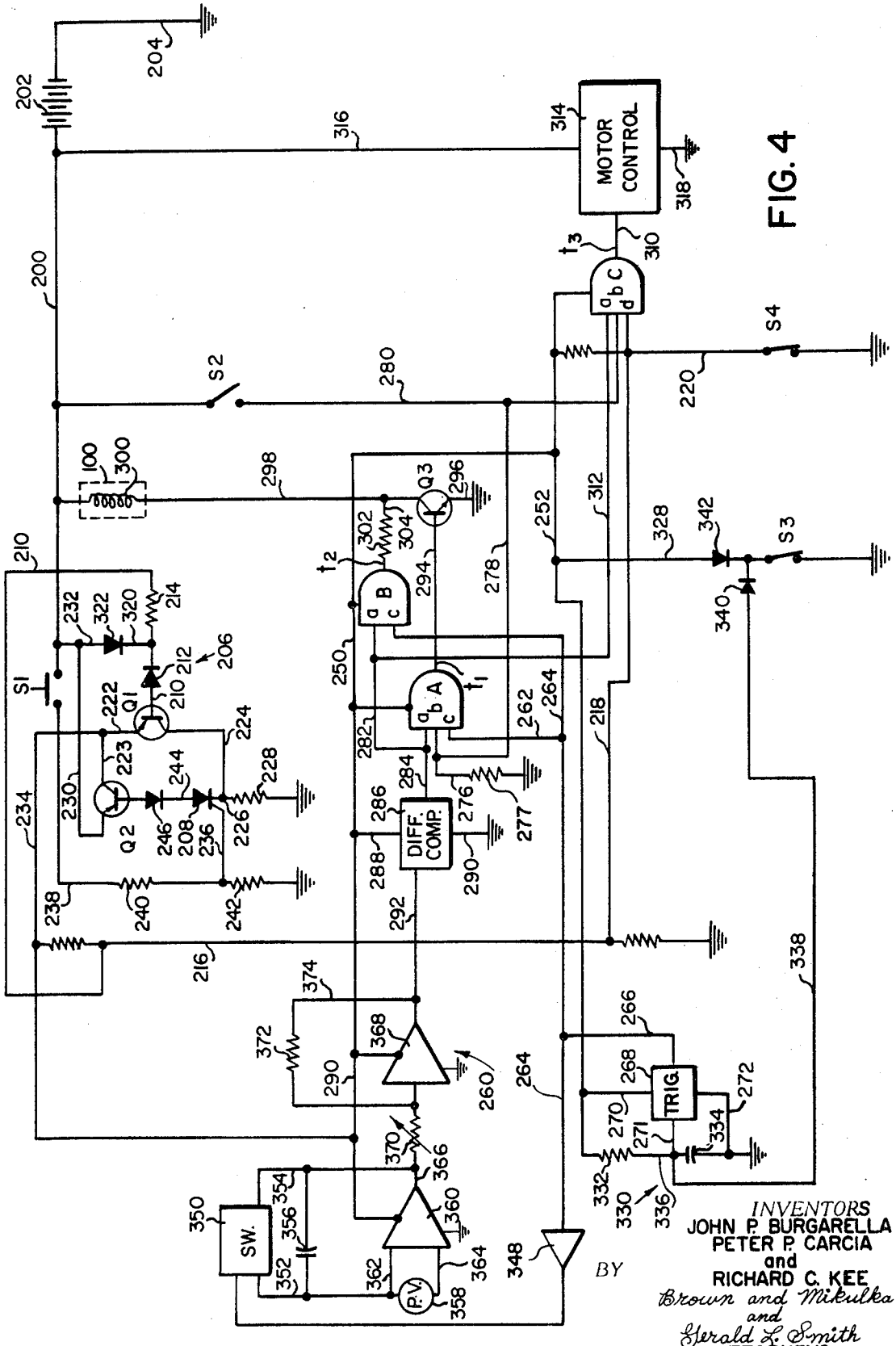

FIG. 4

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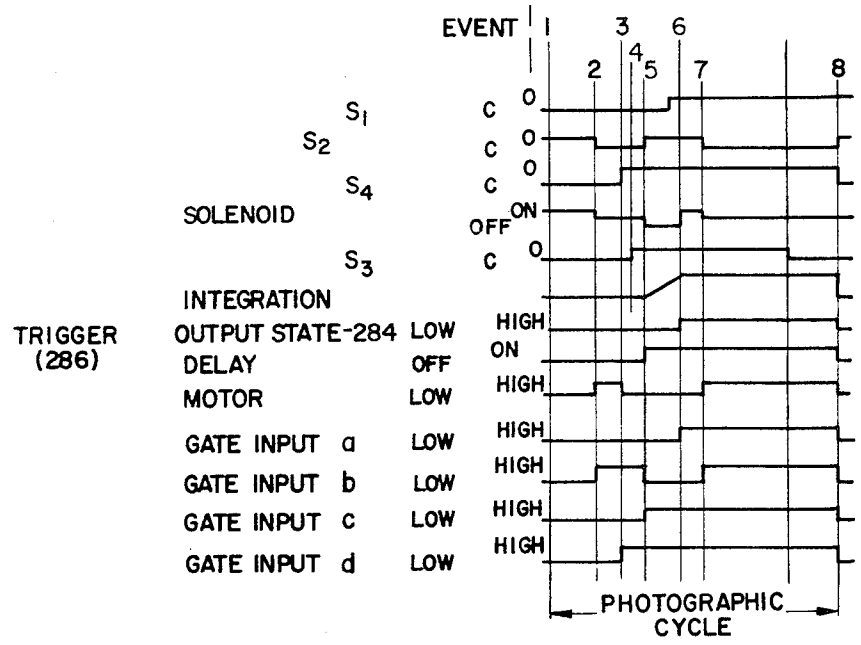

FIG. 6

		GATE A				GATE B			GATE C			
		SOLENOID & POWER DR.				SOL. & POWER DOWN			MOTOR CONTROL			
	EVENT SEQUENCE	a	b	c	t_1	a	c	t_2	a	b	d	t_3
1	START SWITCH CLOSED. FIRST LATCH ENERGIZATION STATE	0	0	0	1	0	0	0	0	0	0	1
2	SHUTTER CLOSES S_2 CLOSES, MOTOR ENERGIZED	0	1	0	0	0	0	0	0	1	0	0
3	REFLEX COMPONENT RISES, S_4 OPENS-SECOND LATCH ENERGIZATION STATE	0	1	0	0	0	0	0	0	1	1	1
4	S_3 OPENS. DELAY INTERVAL COMMENCES	0	1	0	0	0	0	0	0	1	1	1
5	COMMENCE EXPOSURE	0	0	1	0	0	1	1	0	0	1	1
6	TRIGGER-286 THRESHOLD REACHED	1	0	1	1	1	1	0	1	0	1	1
7	SHUTTER CLOSES, S_2 CLOSES. COCKING - S_3 CLOSES.	1	1	1	0	1	1	0	1	1	1	0
8	S_4 CLOSES .	1	1	0	0	1	0	0	1	1	0	1

FIG. 5

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CONTROL SYSTEM FOR PHOTOGRAPHIC APPARATUS

BACKGROUND OF THE INVENTION

Photographic cameras of a hand-held variety have been proposed wherein the procedure for obtaining a photograph of a scene requires only that the operator frame and focus, following which a start button is depressed to cause the control system of the camera to commence a fully automated photographic cycle, the terminus of which witnesses the delivery of a fully processed print.

Preferably, when in a folded condition, these cameras are of thin and compact dimension for ease of carrying, while incorporating a reflex viewing system to optimize framing and focusing. A version of a reflex viewing system suited for use in such cameras is described in U.S. Pat. entitled, "Reflex Camera", by E. H. Land, No. 3,672,281.

The photographic systems embodied within such automatic cameras require the use of a multi-event control process in which a film unit positioned at an exposure plane is secured from light both during procedures of viewing or framing and focusing a scene as well as during the performance of control operations converting the camera from one operational mode to another. For instance, a reflex component is retained against the exposure plane of the camera, thereby blocking light from reaching a film unit when viewing and focusing procedures are carried out through an open shutter or exposure mechanism. In the course of a photographic cycle, this protective positioning of the reflex component is terminated as the component is moved into an exposure position altering the optical path of the camera. During this conversion, the exposure chamber and the film unit contained therewithin are secured by an automated procedure wherein the shutter or exposure mechanism is retained in a closed status to block the optical path of the camera. When the reflex component is properly seated, the camera assumes an exposure mode configuration permitting an automatically controlled exposure interval to ensue.

Following the automatically regulated interval during which a film unit is exposed, the exposure chamber of the camera is again secured by retaining the exposure mechanism in a light blocking position while the noted reflex component is returned to a position securing the exposure plane. Automatic processing of an exposed film unit may take place during this conversion of the camera to a viewing and focusing mode. Once the exposure plane is secured by the reflex component, the shutter is returned to fully open condition in readiness for a next succeeding photographic cycle.

To enhance the convenience of operation of the camera, only a momentary depression of a start button positioned thereon should be needed to cause the camera to carry out a complete photographic cycle. Any electronic latching feature used to perform this function assuring cycle continuity must also be capable of quenching or shutting down the electrically powered system of the camera following each cycle.

Further, both to prevent inadvertent firing of the system causing an attendant undesired commitment to completion of the cycle, and to provide an operator option to abort a cycle without film loss at least during early operational control events, the latch should be capable of being manually deactivated. The latter operator option provides for a convenient monitoring of camera performance, for instance, to assure the presence of an adequate power supply.

Another desirable feature for such automated cameras resides in the provision of an overriding function deactivating the latching feature should the start button be held down throughout and following a photographic cycle. Such a feature would prevent the inadvertent generation of a succeeding photographic cycle. With the arrangement, an operator would be required to release the start button in order to take another picture.

SUMMARY OF THE INVENTION

The present invention is addressed to photographic apparatus and a control system therefore which enjoys the capability of carrying out a series of control events of predetermined order in response to the temporary depression of a start switch. Particularly useful with compact, fully automatic cameras, the invention features an electronic latch having a select delay characteristic. With this characteristic, the control arrangement of the invention provides a camera operator with the opportunity to manually abort a photographic cycle. This aborting option may be carried out during a select introductory portion of a cycle without affecting an otherwise exposed film unit.

Another feature of the invention resides in a provision for preventing an unwanted repetition of photographic cycles as a consequence of inadvertent continued depression of a start switch before and beyond the termination of such a cycle.

In one embodiment of the invention, the latching arrangement is incorporated within a fully automatic camera having a reflex viewing and focusing system. The latter system utilizes a reflex component which is moved between a position securing a film unit positioned at an exposure plane from unwanted illumination and a position re-orienting the optical path of the camera for purposes of exposing the film unit. During movement of this component, the shutter of the camera is closed to secure the exposure chamber thereof. The latching arrangement of the invention is activated for continuously carrying out a given cycle in conjunction with the movement of the reflex component away from the noted securing position. Consequently, a camera operator enjoys the option of aborting any given exposure cycle until such time as a film unit may be jeopardized by the movement of the reflex component away from its securing position.

Another feature and object of the invention is to provide photographic apparatus in the form of a fully automatic camera incorporating a latch arrangement operative to assume a first energization state when a start switch of the camera is actuated and to assume a second energization state in response to the conversion of the optical path of the camera by the reflex component, the second energization state serving to commit the automatic camera to complete a photographic cycle. Should the camera operator depress the start switch throughout and beyond the termination of a given photographic cycle, the latch arrangement of the invention reverts only to its first energization state, thereby permitting the automatic camera to refrain progressing through a next sequential photographic cycle.

Another object and feature of the invention is to provide a fully automatic camera incorporating an exposure mechanism or shutter which is energized to block

the optical path thereof. The camera utilizes a reflex viewing and focusing system having a reflex component which moves from a position securing a film unit at an exposure plane to a position orienting the optical path of the camera for exposing the film unit. A cycle phase switch is positioned within the camera for actuation in correspondence with the movement of the reflex component away from and into the noted securing position. The camera incorporates a latching feature which is selectively delayed throughout an initial period when the exposure mechanism is energized to block the optical path of the camera and until the reflex component is actuated to move from its securing position. As the reflex component moves from its securing position, the noted cycle phase switch is actuated to activate the latch to cause the camera to progress through all of the operational events defining a photographic cycle. This same latch serves to de-energize the control system of the camera at the termination of a photographic cycle when the reflex component is returned into its securing position from its exposure position. Upon such return, the noted cycle phase switch is again actuated to signal the latch arrangement to de-energize the control system of the camera. With such de-energization, the noted exposure mechanism is de-energized to provide an open shutter condition for viewing and focusing attendant with a next succeeding photographic cycle.

Other objects of the invention will in part be obvious and will in part appear hereinafter. The invention accordingly comprises the apparatus and system possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure. For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a pictorial view of a fully automatic handheld camera incorporating the latching features of the instant invention, the view having portions shown in phantom or broken away to reveal internal structure;

FIG. 2 is a fragmentary plan view of an exposure mechanism incorporated in the camera of FIG. 1;

FIG. 3 is a block logic diagram showing the sequence of events occurring during a photographic cycle of the camera of FIG. 1;

FIG. 4 is a schematic diagram of a control circuit as used in conjunction with the control system of the camera of FIG. 1;

FIG. 5 is a truth table or schedule of operational events performed by the control system of the camera of FIG. 1, showing in logic form the input and output status of multi-gate functions incorporated within the circuit of FIG. 4; and

FIG. 6 is an energization status chart for various components of the circuit of FIG. 4 as they operate throughout a photographic cycle.

DETAILED DESCRIPTION

Referring to FIG. 1, a fully automatic camera incorporating the features of an instant invention is portrayed generally at 10. In the course of a single photographic cycle, the components of camera 10 are automatically re-arranged from positions defining a viewing and focusing mode to orientations establishing an exposure mode, following which the initial viewing and focusing mode is re-established and an exposed film unit is automatically processed. The operational events establishing these mode conversions are sequentially carried out in response to a momentary depression of a singular start button 12 mounted within the forward face of an exposure housing 14. Exposure housing 14 is the forwardmost of a grouping of mutually pivoted or articulated housing components including a rear wall 16, forward wall 18 and base member 20. These components are pivotally associated with base member 20 so as to be foldable thereinto in nesting fashion. When so folded from the erected configuration shown, the camera 10 assumes a thin and compact shape suiting it to be conviently carried in the pocket of a garment. The specific hinge connections providing for the articulated structure, while not being visible in the figure, are positioned at axes 22, 24, 26 and at the lower rear portion of exposure housing 14. When erected for making an exposure, rear wall 16, forward wall 18 and exposure housing 14 combine in conjunction with an opaque flexible bellows, a portion of fragment of which is illustrated at 28, to define an exposure chamber generally depicted at 30.

A film supply for camera 10 is provided by a disposable film retaining cassette 32 positioned within base member 20. Cassette 32 is removably positioned against an innerframe, a portion of which is shown at 34. Innerframe 34 is located at and defines the lower surface of exposure chamber 30. Formed having an upward facing rectangular film frame opening defined by a ridge 36, cassette 32 retains a stacked assemblage of film units. The uppermost one of these film units 38 is biased against the bottom of film frame ridge 36, a position coinciding with the exposure plane of camera 10.

Incorporating a highly refined viewing and focusing system, the camera 10 operates in a modified reflex fashion, being convertible between viewing and exposure operational modes by a reflex assembly including a somewhat planar reflex reflecting component 40. Shown in solid line fashion at an intermediate position during a transition from a viewing-focusing mode to an exposure mode of operation, the component 40 is movable during a photographic cycle from a position shown in phantom at 40' representing its viewing-focusing mode orientation to a position shown in phantom 40'' representing its exposure operational mode orientation. Movement between the viewing-focusing and exposure mode positions illustrated in phantom is pivotal, the component 40 being coupled to a rearward portion of inner frame 34 by hinge connections 46 and 48.

Fabricated of a material opaque to light, reflex component 40 serves a dual function when in its viewing-focusing mode position at 40'. In particular, when at the noted 40' position, component 40 extends over and secures or seals the film frame opening defined by ridge 36 of cassette 32. Component 40 additionally is structured to support a viewing surface 50 on its upwardly facing side.

When oriented for viewing and focusing purposes, the components of camera 10 establish an optical path extending from a taking or objective lens assembly mounted within exposure housing 14 at 52, through an open exposure mechanism shown generally at 54, thence to a mirror (not shown) positioned at the inner side of rear wall 16 and thence to viewing surface 50 positioned on the upward surface of component 40. Viewing surface 50 is configured having a texture and

optical design facilitating the focusing of the image of the scene to be photographed. This image may be viewed by the camera operator through a collapsible optical entrance assembly depicted generally at **56.** A configuration suited for viewing surface **50** is described and claimed in a copending application for U.S. Pat. application, Ser. No. 83,030, filed Oct. 22, 1970, by Nathan Gold, entitled, "Reflective Imaging Apparatus", and assigned in common herewith, while the assembly **56** and its related internal components are described in detail and claimed in a copending application for U.S. Patent by James G. Baker, filed Dec. 15, 1970, entitled, "Reflex Camera and Viewing Device", Ser. No. 98,356, and assigned in common herewith.

To enhance the viewing and focusing performance of the camera when in its viewing-focusing operational mode, exposure mechanism **54** must be operative not only to remain open during this operational mode, but also to establish an aperture opening of maximum available size. Mechanism **54** is ideally suited for performing under this operational criteria and is described in more detail and claimed in a U.S. Pat. entitled, "Exposure Control System", by V. K. Eloranta, No. 3,641,889.

Referring additionally to FIG. **2,** exposure mechanism **54** is seen to comprise two blades or elements **60** and **62** which slideably ride across housing **14** in a track (not shown). Each blade, **60** and **62,** is formed having a teardrop-shaped aperture opening shown respectively at **64** and **66.** Additionally, the blades are formed having secondary openings shown respectively at **68** and **70** which move cooperatively before the light detecting elements of a photosensing network positioned behind an entrance optical assembly **72.**

Openings **64** and **66** of respective blades **60** and **62** are mounted for movement across the optical path of the camera **10** as it is established at taking lens **52.** Depending upon the position of blades **60** and **62,** openings **64** and **66** symmetrically overlap to define selectively varying aperture sizes. Secondary openings **68** and **70** are configured in correspondence with the contours of respective openings **64** and **66.** These openings also move in mutual symmetry over the optical path of the light sensing network.

Blades **60** and **62** move in the noted mutual symmetry as a result of their connection with a walking beam as shown at **74.** Walking beam **74** is formed having a centrally disposed hub portion **76** which is journalled for rotation about an upstanding stud (not shown) extending from the rearward portion of exposure control housing **14.** Elongate slots, as at **78** and **80,** are formed in the outward tip portions of walking beam **74** for the purpose of providing connection with pins **82** and **84** extending, respectively, from blades **60** and **62.**

Thus interconnected, the blades **60** and **62** move simultaneously and in correspondence with each other to define a continuous progression of symmetrically configured variable aperture openings over the camera optical path at taking lens **52** as well as over the light sensing network optical path at **72.**

Walking beam **74** is biased for rotation toward a terminal position. This bias is derived from a spring **86,** the central portion of which is wound about hub **76.** The movable end **88** of spring **86** is configured for biasing contact against walking beam **74,** while its stationary end **90** is configured to abut against a pin **92** extending from a rear portion of exposure housing **14.** With spring **86** so connected, the exposure mechanism is biased for moving blades **60** and **62** into a normally open orientation wherein openings **64** and **66,** as well as **68** and **70** cooperate to define widest available apertures. This fully open condition of mechanism **54** is shown in FIG. **2.**

Movement of blades **60** and **62** from their normally open orientation permitting viewing and focusing into a closed orientation blocking the passage of light along the optical path of the camera is carried out by a tractive electromagnetic drive present as a solenoid **100** mounted within exposure housing **14** upon a bracket as at **102.** Solenoid **100** is designed having an internally disposed cylindrical plunger or armature **104** which retracts inwardly within an excitation winding upon energization thereof. Plunger **104** is connected to walking beam **74** by a comb-shaped connector **106** slideably fitted over a pin **108** extending from beam **74.**

When solenoid **100** is energized to retract plunger **104,** walking beam **74** is rotated rapidly against the bias of spring **86** to move blades **60** and **62** into the fully closed orientation shown in FIG. **1.** Note in FIG. **1** that the optical path of the camera as defined through taking lens **52** is completely blocked, thereby securing exposure chamber **30** from the presence of scene light.

During a viewing focusing operational mode, when spring **86** holds blades **60** and **62** in a terminal position defining maximum aperture, reflex component **40** is held in its light securing position **40'** by an actuator system which operates through the interaction of drive springs (not shown) normally biasing component **40** into its elevated position **40''** with a motor driven latching arrangement. Described in detail and claimed in a copending application for U.S. Patent by E. H. Land, I. Blinow, and V. K. Eloranta, entitled, "Reflex Camera", Ser. No. 134,733, filed Apr. 16, 1971, and assigned in common herewith, the actuator system utilizes the output of a motor **120** to regulate a mechanical control linkage including a ram **122** by selectively driving an elongate, thin gear train, certain components of which are shown generally at **124** extending along one side of camera **10.** Gear train **124** includes one reduction ratio circuit terminating in a phase control cam **126** which is rotatably driven through one revolution during the course of a single photographic cycle. Cam **126** operates in conjunction with a cam follower **128** mounted upon the inwardly facing side of elongate ram **122.** Ram **122,** in turn, is slideably positioned along the outer face of gear train **124** and is driveably connected to an input bell crank **130.** Bell crank **130** is coupled into hinge assembly **46** through the noted drive springs which continually bias reflex component **40** to pivot about hinges **46** and **48** into position **40''** abutting the innerface of rear wall **16.** This drive spring as well as other associated linkages required to provide this upward bias are described in detail in the noted application for patent, Ser. No. 134,733.

Through controlled, selective energization of motor **120,** the cooperating cam **126** and cam follower **128** serve to retain reflex component **40** in position **40'** when the camera **10** is in its viewing-focusing mode. When so retained, cam **126** is in a radial orientation wherein it holds follower **128** and associated ram **122** at a terminal rearward position. An energization of motor **120** early in a given photographic cycle causes the gear train to rotate cam **126** to a position whereat follower **128** releases from follower contact therewith,

permitting ram 122 to be driven by the drive springs of the camera to a terminal forward position and, as a consequence, simultaneously permitting reflex component 40 to be driven into its exposure mode position 40''. During this mode transition, exposure mechanism 54 assumes the fully closed condition shown in FIG. 1. FIG. 1 also reveals a solid line representation of reflex component 42 at a position near to its contact with rear wall 16. Note, that follower 128 is off of the contact surface of cam 126 thereby providing its free forwardly directed movement.

As ram 122 commences forward movement in conjunction with the release of reflex component 40 from its position 40', an inwardly extending tab 132 releases from engagement with a resilient leaf 134 of a switch identified generally as S_4. Switch S_4 additionally includes a resilient leaf 136 which is supported along with leaf 134 from an insulative base 138 fixed to base member 20. Accordingly, the contacts 134 and 136 of switch S_4 are opened in correspondence with the initial movement of component 40 from its position 40'. As reflex component 40 somewhat closely approaches its seated position at 40'', tab 132 contacts leaf 140 of another switch depicted generally at S_3. Leaf 140 is normally in contact with leaf 142 and is supported along with contact 142 from an insulative base 144 also fixed to base member 20. It may be noted, therefore, that the contacts of switch S_3 are opened when reflex component 40 approaches its seated position 40''.

Looking again to FIG. 2, another switch identified generally as S_2 is shown positioned within exposure housing 14 so as to be actuated in response to the attainment by blades 60 and 62 of a fully closed position. Switch S_2 is formed having resilient leaves 146 and 148 which are supported from an insulative base 150. The switch is so positioned such than when walking beam 74 is rotated to close blades 60 and 62, an insulative ring 152 positioned upon pin 82 urges leaf 146 into contact with leaf 148.

Returning to FIG. 1, when reflex component 40 reaches position 40'' exposure mode performance ensues with he de-energization of solenoid 100 to release walking beam 74 for rotation under the bias of spring 86. As walking beam 74 rotates and a progressively enlarging aperture opening is defined by blades 60 and 62, the optical path of camera 10 is re-oriented to extend from taking lens 52 through exposure mechanism 54, thence to a mirror 42 positioned on the downward facing side of component 40, thence to the exposure plane and uppermost film unit 38. An exposure is terminated with the re-energization of solenoid 100 to block the optical path, which energization continues until camera 10 has re-assumed its viewing-focusing mode orientation.

With exposure chamber 30 secured by the closure of blades 60 and 62, motor 120 is re-energized to drive gear train 124, thereby rotating cam 126. As cam 126 is rotated, contact is re-asserted with follower 128 to drive ram 122 rearwardly and cock reflex component 40 into its viewing mode position 40'. Simultaneously with this cocking activity, a second reduction circuit within gear grain 124 functions to drive the uppermost one of a pair of processing rolls 160 and 162. Connection between the upper processing roll 160 and gear train 124 is made at a drive pinion 164. During a cocking procedure, a pick mechanism (not shown) urges uppermost film unit 38 from its position within cassette 32 through an egress slot 44 and into the bite or point of contact between rolls 160 and 162. Described in detail in a U.S. Pat. by E. H. Land, No. 3,415,644, entitled, "Novel Photographic Products and Processes", film units as at 38 are structured to contain a processing fluid which is spread therewithin to cause the formation of a visible positive image. At the termination of the above-described cocking and processing functions, the control system of camera 10 is automatically shut down to terminate the photographic cycle.

Turning to FIG. 3, the control events carried out by the instrumentalities of camera 10 are identified in block diagrammatic fashion. Prior to starting a photographic cycle, the components of camera 10 assume viewing-focusing mode orientations in which exposure mechanism blades 60 and 62 locate openings 64 and 66 to establish an aperture of maximum available size, as provided by a de-energization of solenoid 100. Additionally, the exposure plane of camera 10 at 38 is secured as a consequence of reflex component 40 being latched at position 40'. This initial status is revealed at blocks 170 and 172.

Once a scene is appropriately framed and focused, start button 12 is momentarily depressed to close a switch and energize solenoid 100. As solenoid 100 is energized, walking beam 74 is rotated against the bias of spring 86 to block the optical path. This event is depicted at block 174.

When exposure chamber 30 is secured by the optical path, motor 120 is initially energized to release reflex component 40 for movement from position 40' into position 40''. This activity is depicted at block 176.

Following a period of time adequate for component 40 to each position 40'' as depicted at delay block 178, an exposure is commenced with the de-energization of solenoid 100 to release blades 60 and 62, thereby permitting openings 64 and 66 to define progressively enlarging apertures. This exposure activity is depicted at block 180. Note additionally, that the exposure mode performance of the camera commences following delay 178. The light sensing network of the camera provides a signal when an appropriate aperture is defined by blades 60 and 62, which signal causes the re-energization of solenoid 100 to terminate an exposure by closing blades 60 and 62. This exposure termination is depicted at block 182. Note that the exposure mode of the camera terminates at this point and processing as shown at 184 as well as cocking activity ensues at 186.

When processing and cocking is completed, the control system of camera 10 is shut down, solenoid 100 is de-energized and blades 60 and 62 reassume their viewing-focusing mode positions. The latter de-energization of solenoid 100 is depicted at block 188.

While the above cataloged operational events of a photographic cycle are carried out, the control arrangement of the invention provides for an automatic commitment to completion of that cycle following a momentary depression of start button 12. The invention further provides for a period wherein the operator may optionally abort the photographic cycle. Preferably, this optional portion of the cycle terminates with the initial closure blades 60 and 62. This optional portion of the cycle is labled in FIG. 3. With the latching arrangement, automatic shutdown at the termination of a given photographic cycle is facilitated with the de-activation of the latching feature. This de-activation

also is labeled in the figure as commencing with the final de-energization of solenoid **100** to open the exposure mechanism blades **60** and **62.**

Referring to FIG. **4,** a control circuit for operating camera **10** in accordance with the above-described program is depicted. As noted earlier, a photographic cycle is commenced with the depression of a start button **12.** This depression serves to close a switch designated S_1 in the figure. Switch S_1 is normally biased towards an open circuit condition. Closure of switch S_1 activates a primary power line **200.** Line **200** is connected with the positive side of a battery **202.** The opposite side of battery **202** is connected through line **204** to ground.

When activated, line **200** serves to energize a latching function indicated generally at **206.** Upon being energized, latching function **206** assumes a first energization state providing an operator option for energizing the remainder of the control circuit through an auxiliary power line system. The first energization state is established through the interaction of two PNP pass transistors Q_1 and Q_2 which selectively operate to regulate the conductive status of a gate controlled thyristor device having a latching characteristic, such as a silicon controlled rectifier (SCR) as at **208.**

During the noted first energization state, both transistors Q_1 and Q_2 are mutually forwardly biased. For instance, when switch S_1 is closed, primary power line **200** is connected with line **238** which, in turn, is connected through level setting resistors **240** and **242** to ground. Resistors **240** and **242** provide a voltage level adjustment to establish a biasing potential and resulting gating current into the gate at line **236** of SCR **208.** Thus gated, SCR **208** is rendered conductive. The cathode of SCR **208** is connected by a line **226** through level setting resistor **228** to ground, while its anode is coupled by line **244** through a diode **246** to the base of transistor Q_2. The emitter of transistor Q_2 is coupled along lines **230** and **230** to primary line **200,** while its collector is connected along line **223** to auxiliary power line **234** from line **223.** Thus connected, a conducting SCR **208** draws anode current through the emitter-base junction of transistor Q_2, diode **246** and line **244.** This current also serves to saturate transistor Q_2. Thus saturated, transistor Q_2 effectively connects lines **222, 223,** and **234** to primary power line **200,** and, additionally, completes a signal path into a pass line **222.** Pass line **222** is connected between line **223** and the emitter of transistor Q_1, while the collector thereof is connected by pass line **224** to line **226** located on the cathode side of SCR **208.** Transistor Q_1 is now turned on by current flowing from line **220** through its base-emitter junction, thence to ground through a network including line **210,** diode **212,** bias resistor **214,** line **210,** line **216,** line **218,** line **220** and a closed switch S_4. Switch S_4 corresponds with that described in connection with FIG. **1,** the switch remaining closed until reflex component **40** moves initially from its position **40'.** When transistor Q_1 is forwardly biased, conduction is permitted through pass lines **222** and **224.** In effect, pass lines **223** and **224** can be considered to connect transistor Q_1 in parallel with line **224** containing SCR **208.**

In view of the noted pass line activity, SCR **208,** while remaining gated, conducts under a potential drop and biasing current flow of insufficient levels to permit it to "latch" or maintain conduction once gated. The non-sustaining, low-base current flow from transistor Q_2 through line **224** as well as the insufficient potential drop across SCR **208** being occasioned, as noted, by the forward biasing of transistor Q_1 and consequent activation of pass lines **222** and **224.** Diode **246** is present in line **244** to assure that the voltage drop across SCR **208** is such as to maintain its "unlatched" condition during the noted first energization state.

The energization of auxiliary power line **234,** in turn, energizes branch power line **250,** also energizing branch power line **252.** Branch power lines **250** and **252,** when so energized, establish the initial conditions at the input and output terminals of the components on the control circuit assuring the commencement of a photographic cycle. These initial inputs and outputs for multi-function gates A, B and C are depicted in Boolean enumeration in FIG. **5** at event No **1.** For purposes of understanding the tabulations of FIG. **5,** as well as to facilitate the description to follow, when the inputs or outputs of such components are at ground reference potential, they are referred to as "low", and/or such output is digitally indicated as 0. Conversely, when these inputs and outputs assume or approach the voltage status of power line 200, they are referred to as being "high" and are given the binary designation 1. Further, the operational events as tabulated and numbered in FIG. **5** are again identified by the same numeration in FIG. **6** wherein the open and closed status of switches S_1 through S_4 of the circuit as well as the energization status of various components thereof are shown in comparative time scale fashion. It may be noted further, that certain of the gate input terminals receive common signals. These common terminals are identified by letters *a–d.* Additionally, the outputs of multifunction GATES A, B and C are identified respectively as t_1, t_2 and t_3.

Energization of branch power line **250** at the commencement of a photographic cycle serves to establish those input conditions shown as event No. **1** of FIG. **5** at the input terminals of multi-function power GATES A and B. These input conditions are derived both from the positions of the switches within the circuit as well as from the output of a light sensitive exposure control network depicted generally at **260.** More particularly, the *c* gate input terminals of GATES A and B are low and are derived respectively form lines **262** and **264.** Line **264** is coupled through line **266** to the output of a Schmitt trigger **268.** Schmitt trigger **268** may be of conventional design, having a normally non-conductive input stage and a normally conductive output stage. Energized from branch power line **252** through line **270** and coupled to ground through line **272,** the output at **266** of Schmitt trigger **268** remains low until a signal is received at its input **274** which is at least equal to a predetermined reference level. Upon receipt of such signal, the output at line **266** assumes a high status. Accordingly, common gate input *c* remains low pending the triggering of Schmitt trigger **268.**

Gate input terminal *b* of GATE A exhibits a low state by virtue of its connection through line **276** and resistor **277** to ground. Additionally, this status is permitted as a result of its connection through lines **278** and **280** to switch S_2, the switch remaining open until such time as blades **60** and **62** of exposure mechanism **54** are fully closed.

Common gate input terminals *a* of GATES A and B are initially low as a result of their connection from along lines **282** and **284** to the output of another

Schmitt trigger **286.** Schmitt trigger **286** is energized through line **288** from branch power line **250** and is coupled to ground through line **290.** Similar to Schmitt trigger **268,** the output of Schmitt trigger **286** is normally low and will assume a high status in response to the receipt at its input **292** of a signal above a predetermined triggering or threshold level. The status of input **292** is regulated by an exposure control signal generated at network **260.**

The resultant initial output t_1 of GATE A which is present at line **294** is high and is imposed upon the base of an NPN transistor Q_3. The emitter of transistor Q_3 is coupled along line **296** to ground, while its collector is connected to line **298.** Line **298,** in turn, connects the excitation winding **300** of solenoid **100** to primary power line **200.** Solenoid **100** is designated functionally in FIG. **4** by a dashed boundary. The high status at line **294** serves to forward bias the base-emitter junction of transistor Q_3, thereby energizing winding **300** to cause exposure mechanism **54** to block the optical path of camera **10.** The output t_2 of GATE B is low at the commencement of a photographic cycle and is coupled through a current limiting resistor **302** and line **304** to line **298.** GATE B serves a powering down function wherein solenoid **100** is energized at a lower current level when the plunger thereof is in its fully retracted position. To carry this out, GATE B diverts solenoid energizing current through limiting resistor **302.** When transistor Q_3 is forward biased, however, this diversion through resistor **302** is insignificant. The powering down feature of the control system is described and claimed in a copending application for U.S. Pat. application by C. H. Biber and E. K. Shenk entitled, "Photographic Apparatus with Solenoid Powered Instrumentalities," Ser. No. 163,948, filed July 19, 1971 and assigned in common herewith.

Solenoid **100** being energized, blades **60** and **62** are driven to their fully closed position and when this position is reached, contacts **146** and **148** of switch S_2 are closed (FIG. **2**). The closure of switch S_2 alters the *b* gate input terminal states at line **278** from a low to a high. In consequence, as shown at Event No. **2** in FIGS. **5** and **6,** the output t_1 of GATE A is converted to a low status, thereby reverse biasing transistor Q_3. As transistor Q_3 is turned off, energization of winding **300** is continued at a reduced current level through resistor **302** and GATE B. A change of the *b* gate input terminal state from a low to a high also alters the output t_3 of GATE C. During the first event of a photographic cycle, the output t_3 at line **310** of GATE C is high. This high output is established as a result of a low present at line **312** and introduced to input terminal *a*. Line **312** is connected to line **282,** the latter providing a common coupling of the corresponding inputs of GATES A and B. Gate input terminal *d* remains low in consequence of its connection through lines **218, 220** and closed switch S_4 to ground. Input terminal *b*, being coupled to line **280** and switch S_2, alters from a low state to a high state upon the closure of switch S_2. The resultant low output t_3 of GATE C, when introduced through line **310,** signals a motor control function **314** to energize motor **120.** Control function **314** is energized from primary power line **200** through line **316** and is coupled to ground through line **318.** The resultant energization of motor **120** drives phase control cam **126** from gear train **124** to effect the release or unlatching of reflex component **40** for movement from its viewing-focusing position **40'** (FIG. **1**). When reflex component **40** begins to rise from position **40',** tab **132** of ram **122** is released from contact with leaf **134** of switch S_4, switch S_4 opens.

As disclosed as event No. **3** in FIGS. **5** and **6,** the opening of switch S_4 alters the status of input terminal *d* of GATE C to a high condition and the resultant output t_3 of the gate becomes high. A high status at line **310** serves to signal motor control function **314** to de-energize motor **120.**

Inasmuch as component **40** is uncovering the exposure plane of the camera during its upward movement, latching function **206** now operates to commit the control system of the camera **10** to completion of a photographic cycle. As noted earlier, the base of transistor Q_1 is coupled from along lines **210, 216, 218** and **220** to switch S_4. When switch S_4 opens, transistor Q_1 draws insufficient base current to maintain a forwardly biased condition. This reverse biasing of transistor Q_1 isolates pass lines **222** and **224** and as a consequence, adequate sustaining current as well as sustaining voltage is presented across SCR **208.** SCR **208** then latches to provide continuous conduction in the absence of a gating input from line **236.** As SCR **208** conducts, transistor Q_2 is held in a forward biased condition, auxiliary voltage line **234** being energized from line **223.** This latched condition of SCR **208** and transistor Q_2 represents a second energization state of latching function **206.**

During the second energization state of latching function **206,** line **320** including diode **322** and connecting lines **232** and **210** serve to assure the maintenance of a reverse biased condition at transistor Q_1.

As a reflex component **40** closely approaches its exposure mode position at **40'',** switch S_3, connected within line **328** between line **252** and ground, is opened in consequence of the movement of ram **122.** Represented as event No. **4** in FIGS. **5** and **6,** the opening of switch S_3 serves to activate an R-C timing network identified generally at **330.** Formed of a timing resistor **332** and a timing capacitor **334** coupled within line **336** between ground and branch power line **252,** network **330** serves to impose a delay to the commencement of exposure regulation. This delay is selected having a time constant sufficient to permit reflex component **40** to fully seat at its position **40''.** Network **330** is activated upon removal of a shunt about capacitor **334** which is constituted by a line **338** and diode **340** and connected from a point intermediate capacitor **334** and resistor **332** to ground through a diode **340** and switch S_3. Diode **340** serves to isolate line **338** from spurious signals and the like. Similarly a diode **342** connected at line **328** above switch S_3 isolates line **252** from spurious signals.

Following an appropriate time-out of network **330,** a threshold signal is developed at input **274** of differential comparator **268,** thereby triggering the comparator to alter its output at line **266** to a high status. This high status is introduced to line **264** to simultaneously alter the state of all common gate inputs *c* to a high or 1 status. Such alteration changes the output t_2 of GATE B to a high status, thereby abruptly terminating current flow in line **298** and de-energizing winding **300** of solenoid **100.** With this de-energization, blades **60** and **62** of exposure mechanism **54** commence to open under the force of spring **86.**

Simultaneously with the de-energization of winding **300,** a signal is imposed from line **264** through an in-

verter **348** to trigger an electronic switch shown generally at **350.** When so triggered, switch **350** removes a shunt established by lines **352** and **354** across a timing capacitor **356.** The removal of this shunt activates light sensitive network **260.**

Network **260** includes a photovoltaic cell **358** positioned within camera **10** behind openings **68** and **70** of exposure mechanism **54** and connected with the input of an operational, differential type amplifier **360** by lines **362** and **364.** Timing capacitor **356** is coupled within a feedback path between the output **366** of amplifier **360** and its input at line **362.**

Described in greater detail in a U.S. Pat. by J. P. Burgarella, entitled, "Automatic Exposure Control System with Fast Linear Response," No. 3,620,143, the output of this light sensing arrangement at line **366** represents an integrated valuation of scene lighting as witnessed at the optical path of camera **10.** This output is varied in accordance with the sensitometric properties of film being exposed by a second amplification stage **368** operating in conjunction with gain adjusting variable resistor **370** and calibrating resistor **372,** the latter being positioned within a feedback path line **374.** The noted film speed and calibration adjustment of the output at line **366** is described in greater detail and claimed in a U.S. Pat. by J. P. Burgarella, entitled, "Exposure Control System," No. 3,641,891.

The adjusted output from network **260** is presented along line **292** to Schmitt trigger **286.** When the signal value at line **292** reaches the threshold or trigger level of Schmitt trigger **286,** the output thereof at line **284** converts from a low to a high state. This conversion is represented in FIGS. **5** and **6** as operational event No. **6.** As displayed in those figures, the resultant high output at line **284** alters the status of common gate input terminal *a* to a corresponding high status. The resultant outputs of GATES A and B are converted. For instance, output t_1 of GATE A is changed to a high status and output t_2 of GATE B is changed to low status. A high output at line **294** forward biases the base-emitter junction of transistor Q_3 thereby energizing solenoid winding **300** from line **298,** in turn, causing solenoid **100** to block the optical path of camera **10** by closing blades **60** and **62.** This action terminates an exposure interval.

As blades **60** and **62** are closed, switch S_2 closes to alter the status of input terminals *b* at GATES A and C from high to a low states. As depicted by event No. **7** in FIGS. **5** and **6,** the latter input alteration changes the output t_1 of Gate A to a low status, thereby turning off transistor Q_3. The earlier described power-down function performed by GATE B continues the energization of winding **300** at a lower current level. In addition to this power-down feature, the change of status of input terminals *b* also changes the output t_3 of GATE C to a low status, thereby activating motor control function **314** to, in turn, energize motor **120.** Thus energized, motor **120** rotates cycle phase cam **126** to drive ram **122** rearwardly, thereby cocking or returning reflex component **40** to position **40'**. Simultaneously, an exposed film unit **38** is processed through rotating process rolls **160** and **162.**

As reflex component **40** is driven from position **40''**, switch S_3 is closed, thereby reactivating the shunt imposed by line **338** about timing capacitor **334.** The output of Schmitt trigger **268** returns to a low status to, in turn, change the state of common gate input terminals *c* to a low status.

When reflex component **40** is seated in its viewing-focusing position at **40'**, tab **132** of ram **122** recloses switch S_4 by urging leaf **134** into contact with leaf **136.** This action changes the condition of gate input terminal *d* from a high to a low status to, in turn, change output t_3 at line **310** to a high status, thereby de-energizing motor control function **314** to stop motor **120.**

The final closing of switch S_4 also reasserts forward bias at transistor Q_1 of latching function **206.** This is carried out, as before, by bringing line **210,** coupled to the base of transistor Q_1 to ground level as a result of its connection with switch S_4 through lines **216, 218** and **220.** When transistor Q_1 is drawn into conduction, the pass function of lines **222, 223,** and **224** is reasserted and the voltage drop across SCR **208** is diminished below its sustaining level. Inasmuch as no gating current is supplied from switch S_1, the components of latching function **206** as well as the entire circuit are de-energized for shutdown. It may be noted that at shutdown, latching function **206** reassumes its first energization state.

Should switch S_1 be held in a closed circuit condition throughout a photographic cycle, latching function **206** will remain in its first energization state and the control circuit will progress through an entire photographic cycle without assuming a second energization or latched state. Should switch S_1 be held in its closed circuit position before and following the termination of a photographic cycle, latching function **206** will remain in the noted first energization state, however, the control circuit will not permit camera **10** to progress through a next succeeding photographic cycle. Referring to FIG. **5** representing a condition for a continually closed switch S_1, note that at the event No. **8** a closure of switch S_4, the gate input states to motor control GATE C are different than the corresponding inputs for event No. **1** at the commencements of a photographic cycle. In particular, the output **284** of Schmitt trigger **86** remains high, thereby holding gate input terminal *a* at a high status. With such status of input terminal *a* at GATE C, the output t_3 of GATE C remains high and motor control function **314** is incapable of energizing motor **120.** Without such energization, reflex component **40** cannot move from its viewing-focusing position at **40'** and switch S_4 cannot be opened. While blades **60** and **62** of exposure mechanism **54** remain closed as long as switch S_1 is held down, camera **10** will not progress through a next succeeding photographic cycle. Upon release of switch S_1 to an open circuit condition and consequent de-energization of the control circuit, the input terminal condition to the gating functions are re-aligned to permit the generation of a next succeeding photographic cycle.

It readily can be seen that many variations and modifications of the present invention are possible in the light of the aforementioned teachings, and it will be apparent to those skilled in the art that various changes in form and arrangement of components may be made to suit requirements without departing from the spirit and scope of the invention. It is, therefore, to be understood that within the scope of the appended claims, the instant invention may be practiced in a manner otherwise than is specifically described herein.

What is claimed is:

1. A control system for photographic apparatus of a variety including a source of electrical energy, said system being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:
instrumentality means actuable to perform said operational events;
control means energizable from said source to selectively effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order;
manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means; and
latch means coupled with said start switch means and said control means for effecting the continuous energization of said control means from said source following the actuation of said start switch means to effect said closed circuit condition at least until completion of said first operational event so as to commit said control means to effect said instrumentality means performance through said photographic cycle last event.

2. The control system of claim 1 in which said latch means is operative to selectively interrupt the said energization of said control means from said source in conjunction with the performance of said last operational event.

3. The control system of claim 1 in which:
said instrumentality means includes an exposure mechanism selectively actuable to block and unblock an optical path;
said control means includes control network means operable during a photographic cycle to generate a signal for effecting the actuation of said exposure mechanism to block said optical path to terminate a photographic exposure, said control means being operative to inhibit the carrying out of a next succeeding photographic cycle when said start switch means is in said closed circuit condition and said signal is generated.

4. The control system of claim 1 in which:
said control means includes cycle phase switch means actuable in conjunction with the performance of said last operational event; and
said latch means is operative to selectively discontinue the said energization of said control means from said source in response to said cycle phase switch means actuation.

5. The control system of claim 4 in which said control means is operative to prevent the repetition of a said photographic cycle when said start switch means is in said closed circuit condition and said phase cycle switch means is actuated in conjunction with the performance of said last operational event.

6. A control system for photographic apparatus of a variety including a source of electrical energy, said system being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:
instrumentality means actuable to perform said operational events;
control means energizable from said source to selectively effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order;
manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means; and
latch means coupled with said start switch means and said control means for effecting the continuous energization of said control means from said source following the actuation of said start switch means to effect said closed circuit condition at least until completion of said first operational event, said latch means being operative to assume a first energization state when said start switch means is actuated to assume said closed circuit condition and to assume a second energization state subsequent to said first event and when said start switch means is in said open circuit condition, and being further operative to selectively interrupt the said energization of said control means from said source in conjunction with the performance of said last operational event.

7. The control system of claim 6 wherein said latch means is operative to assume said first energization state whenever said start switch means is in said closed circuit condition during a given said photographic cycle.

8. The control system of claim 6 wherein said latch means is operative to assume only said first energization state when said start switch means is continuously retained in closed circuit condition subsequent to and following the termination of a said photographic cycle.

9. The control system of claim 6 in which:
said control means includes cycle phase switch means actuable in conjunction with the performance of said last operational event; and
said latch means is operative to assume only said first energization state when said cycle phase switch means is actuated and said start switch means is in said closed circuit condition.

10. The control system of claim 9 wherein said latch means is operative to discontinue the said energization of said control means from said source in response to said cycle phase switch means actuation and when said start switch means is in said open circuit condition.

11. The control system of claim 6 in which:
said control means includes cycle phase switch means initially actuable following said first operational event and subsequently actuable in conjunction with said last operational event;
said latch means is operative to assume said second energization state when said cycle phase switch means is initially actuated and said start switch means is in said open circuit condition.

12. The control system of claim 11 wherein said latch means is operative to assume said first energization state prior to said cycle phase switch means initial actuation and when said start switch means is in said closed circuit condition.

13. The control system of claim 12 wherein said latch means is operative during a given said photographic cycle to assume only said first energization state when said cycle phase switch means is subsequently actuated and said start switch means is in closed circuit condition.

14. The control system of claim 13 wherein said latch means is operative to discontinue the said energization of said control means from said source of electrical energy in response to said cycle phase switch means subsequent actuation and when said start switch means is in said open circuit condition.

15. A control system for photographic apparatus of a variety including a source of electrical energy, said system being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:

instrumentality means actuable to perform said operational events;

control means energizable from said source to effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order;

manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means;

latch means responsive to said start switch means actuation and coupled with said control means for effecting a continuous energization of said control means from said source following the movement of said start switch means to said closed circuit condition for committing said control means to effect said instrumentality means performance through said photographic cycle last event;

said control means including circuit components operative to prevent said control system from carrying out a next succeeding photographic cycle when said start switch means is in said closed circuit condition during the performance of said last operational event.

16. A control system for photographic apparatus of a variety including a source of electrical energy, said system being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:

instrumentality means actuable to perform said operational events;

control means energizable from said source to effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order;

manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means;

latch means responsive to said start switch means actuation and coupled with said control means for effecting a continuous energization of said control means from said source following the movement of said start switch means to said closed circuit condition and only following the completion of the first of said operational events for committing said control means to effect said instrumentality means performance through said photographic cycle last event;

said control means being operative to prevent said control system from carrying out a next succeeding photographic cycle when said start switch means is in said closed circuit condition during the performance of said last operational event.

17. A control system for photographic apparatus of a variety energized from a source of electrical energy, said system being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:

instrumentality means actuable to perform said operational events;

control means energizable from said source to effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order;

manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means;

latch means responsive to said start switch means actuation and coupled with said control means for effecting a continuous energization of said control means from said source following the movement of said start switch means to said closed circuit condition for committing said control means to effect said instrumentality means performance through said photographic cycle last event, said latch means being further operative to interrupt said energization of said control means from said source in conjunction with the performance of said last operational event and when said start switch means is in said open circuit condition;

said control means being operative to prevent said control system from carrying out a next succeeding photographic cycle when said start switch means is in said closed circuit condition during the performance of said last operational event.

18. Photographic apparatus comprising:

means defining an optical path for imaging a scene to be photographed;

exposure mechanism means actuable to block and unblock said optical path to effect the exposure of photographic material at an exposure plane;

reflex means actuable to convert said optical path between viewing and exposure mode configurations;

a source of electrical energy;

control means energizable from said source for regulating said exposure mechanism means and said reflex means in accordance with a predetermined order of operational events to define a photographic cycle;

switch means manually actuable between open circuit and closed circuit conditions for energizing said control means at least during a select initial portion of said photographic cycle; and

latch means present in fixed circuit configuration and coupled with said start switch means and said control means for effecting the continuous energization of said control means from said source following said select initial portion of said photographic cycle.

19. The photographic apparatus of claim 18 in which said latch means is operative to selectively terminate the said energization of said control means to terminate a said photographic cycle.

20. The photographic apparatus of claim 18 in which said latch means is operative to effect the continuous energization of said control means when said reflex means commences a said optical path conversion from said viewing mode configuration to said exposure mode configuration.

21. The photographic apparatus of claim 18 in which:

said control means includes a control network having an output signal for effecting a said actuation of said exposure mechanism means to block said optical path so as to terminate a said exposure, said control means being operative to prevent the repetition of a said photographic cycle when said switch means is retained in said closed circuit condition and said control network generates said output signal.

22. Photographic apparatus of a variety incorporating a source of electrical energy, comprising:

means defining an optical path for imaging a scene to be photographed;

exposure mechanism means actuable to block and unblock said optical path to effect the exposure of photographic material at an exposure plane;

reflex means actuable to convert said optical path between viewing and exposure mode configurations;

control means energizable from said source for regulating said exposure mechanism means and said reflex means in accordance with a predetermined order of operational events to define a photographic cycle;

switch means manually actuable between open circuit and closed circuit conditions for energizing said control means at least during a select initial portion of said photographic cycle;

said control means being operative to actuate said exposure mechanism means to block said optical path in response to the actuation of said start switch means to said closed circuit condition at the commencement of a said photographic cycle, and to actuate said reflex means to convert said optical path from said viewing mode to said exposure mode configuration in response to said blocking of said optical path; and

latch means coupled with said start switch means and said control means for effecting the continuous energization of said control means from said source in response to said reflex means actuation.

23. The photographic apparatus of claim **22** wherein said latch means is operative to assume a first energization state when said start switch means is actuated to assume said closed circuit condition, and to assume a second energization state in response to said reflex means actuation and when said start switch means is in said open circuit condition.

24. The photographic apparatus of claim **23** wherein said latch means is operative to assume only said first energization state when said start switch means is continuously retained in said closed circuit condition subsequent to and following the termination of a said photographic cycle.

25. The photographic apparatus of claim **22** in which:

said control means includes cycle phase switch means actuable in response to the said actuation of said reflex means converting said optical path from said viewing mode to said exposure mode configuration; and

said latch means is operative to effect said continuous energization of said control means in response to said cycle phase switch actuation.

26. The photographic apparatus of claim **25** wherein said latch means is operative to assume a first energization state when said start switch means is actuated to assume said closed circuit condition, and to assume a second energization state in response to said cycle phase switch actuation and when said start switch means is in said open circuit condition.

27. The photographic apparatus of claim **26** wherein said latch means is operative to assume only said first energization state when said start switch means is in said closed circuit condition.

28. The photographic apparatus of claim **27** in which said control means includes a control network for generating an output signal for effecting an actuation of said exposure mechanism means to block said optical path to terminate a said exposure; said control means being operative to prevent said apparatus from carrying out a next succeeding said photographic cycle in the presence of said output signal and when said latch means is in said first energization state.

29. A photographic camera of a variety utilizing a source of electrical energy comprising:

means defining an optical path for imaging a scene to be photographed at an exposure plane;

means for supporting photosensitive material at said exposure plane;

exposure mechanism means selectively energizable from said source to block and unblock said optical path for regulating the exposure of said photosensitive material;

reflex component means movable between a securing position blocking the passage of light to said exposure plane and an exposure position orienting said optical path to effect said exposure of said photosensitive material;

control means energizable from said source for regulating said exposure mechanism means and said reflex component means in a manner defining a given photographic cycle wherein said exposure mechanism means is initially energized to block said optical path at the commencement of a said cycle whereupon said reflex component means is moved initially from said securing position into said exposure position, following which said exposure mechanism means is de-energized and subsequently selectively energized to define an interval of exposure, said subsequent energization being maintained to block said optical path while said reflex component means is returned to said securing position, said cycle then being terminated with a subsequent de-energization of said exposure mechanism means;

start switch means manually actuable to move from an open circuit condition to a closed circuit condition energizing said control means; and

latch means coupled with said start switch means and said control means for effecting a selective continuous energization of said control means commencing with said reflex component means initial movement and continuing until said cycle termination.

30. The photographic camera of claim **29** wherein said latch means is operative to selectively terminate the said energization of said control means to effect said cycle termination.

31. The photographic camera of claim **30** wherein said latch means is operative to assume a first energization state when said start switch means is in said closed circuit condition, and to assume a second energization state with said commencement of said reflex means initial movement, and when said start switch means is in said open circuit condition.

32. The photographic camera of claim 31 wherein said latch means is operative to effect said cycle termination only when in said second energization state.

33. A control system for photographic apparatus of a variety including a source of electrical energy, said apparatus being actuable to serially perform operational events in a predetermined order from first to last defining a photographic cycle, comprising:

instrumentality means actuable from a viewing mode condition to perform said operational events;

control means energizable from said source to fully automatically effect said instrumentality means actuation to perform said operational events in accordance with said predetermined order, said control means causing said instrumentality means to be automatically returned to said viewing mode condition at the termination of the last of said operational events;

manually actuable start switch means movable between an open circuit condition and a closed circuit condition for selectively connecting said source of electrical energy with said control means;

said control means being operative to prevent said control system from carrying out a next succeeding photographic cycle when said start switch means is in said closed circuit condition during the performance of said last operational event.

34. A photographic camera of a variety utilizing a source of electrical energy comprising:

means defining an optical path for imaging a scene to be photographed at an exposure plane;

means for supporting photosensitive material at said exposure plane;

exposure mechanism means selectively energizable from said source to block and unblock said optical path for regulating the exposure of said photosensitive material;

reflex component means movable between a securing position blocking the passage of light to said exposure plane and an exposure position orienting said optical path to effect said exposure of said photosensitive material;

start switch means manually actuable to move from an open circuit condition to a closed circuit condition;

control means energizable from said source in response to said start switch means actuation for regulating said exposure mechanism means and said reflex component means in a manner defining a given photographic cycle wherein said exposure mechanism means is initially energized to block said optical path at the commencement of a said cycle whereupon said reflex component means is moved initially from said securing position into said exposure position, following which said exposure mechanism means is de-energized and subsequently selectively energized to define an interval of exposure, said subsequent energization being maintained to block said optical path while said reflex component means is returned to said securing position, said cycle then being terminated with a subsequent de-energization of said exposure mechanism means, said control means being further operative to prevent the completion of a next succeeding photographic cycle when said subsequent exposure mechanism means de-energization has occurred and said start switch means is retained in said closed circuit condition prior to and beyond said termination of said given photographic cycle; and

latch means coupled with said start switch means and said control means for effecting a selective continuous energization of said control means commencing with said reflex component means initial movement and continuing until said cycle termination.

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