United States Patent [19]

Aizawa et al.

[11] E **Re. 29,505**

[45] Reissued **Dec. 27, 1977**

[54] **ELECTRIC CONTROL DEVICE FOR A CAMERA**

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[73] Assignee: **Canon Kabushiki Kaisha**, Tokyo, Japan

[21] Appl. No.: **555,729**

[22] Filed: **Mar. 6, 1975**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **3,812,510**
Issued: **May 21, 1974**
Appl. No.: **319,743**
Filed: **Dec. 29, 1972**

[30] **Foreign Application Priority Data**

Dec. 30, 1973 Japan 47-1089

[51] **Int. Cl.**[2] **G03B 7/00**; G03B 9/28

[52] **U.S. Cl.** **354/235**; 354/241; 354/173; 354/51

[58] **Field of Search** 354/241, 242, 267, 48, 354/50, 51, 235, 170–173; 352/121

[56] **References Cited**

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Primary Examiner—Stephen J. Tomsky
Assistant Examiner—William B. Perkey
Attorney, Agent, or Firm—Toren, McGeady and Stanger

[57] **ABSTRACT**

An automatic shutter control system for a camera includes a continuous rotatable motor coupled to a pair of separately engageable electromagnetic clutches. The clutches are respectively operable, when engaged, for releasing the shutter to commence exposure and for winding up the shutter after exposure has terminated. When camera operation is initiated, the first clutch is engaged to release the shutter and to trigger the start of a manually selectable exposure duration. At the conclusion of the selected duration, the first clutch is disengaged and the second clutch is engaged to begin the wind-up of the shutter. An inertial sensor on the motor terminates the wind-up operation and disengages the second clutch when the increased torque on the motor from wind-up reaches a predetermined value. Where continuous operation of the camera is desired, the completion of wind-up triggers an interval control circuit which effects the reengagement of the first clutch after a prescribed time delay to initiate another cycle of operation. Facilities are provided for overriding the manually set exposure duration whenever the required film exposure time exceeds such set duration to automatically delay the completion of the shutter release operation until the completion of the exposure.

22 Claims, 16 Drawing Figures

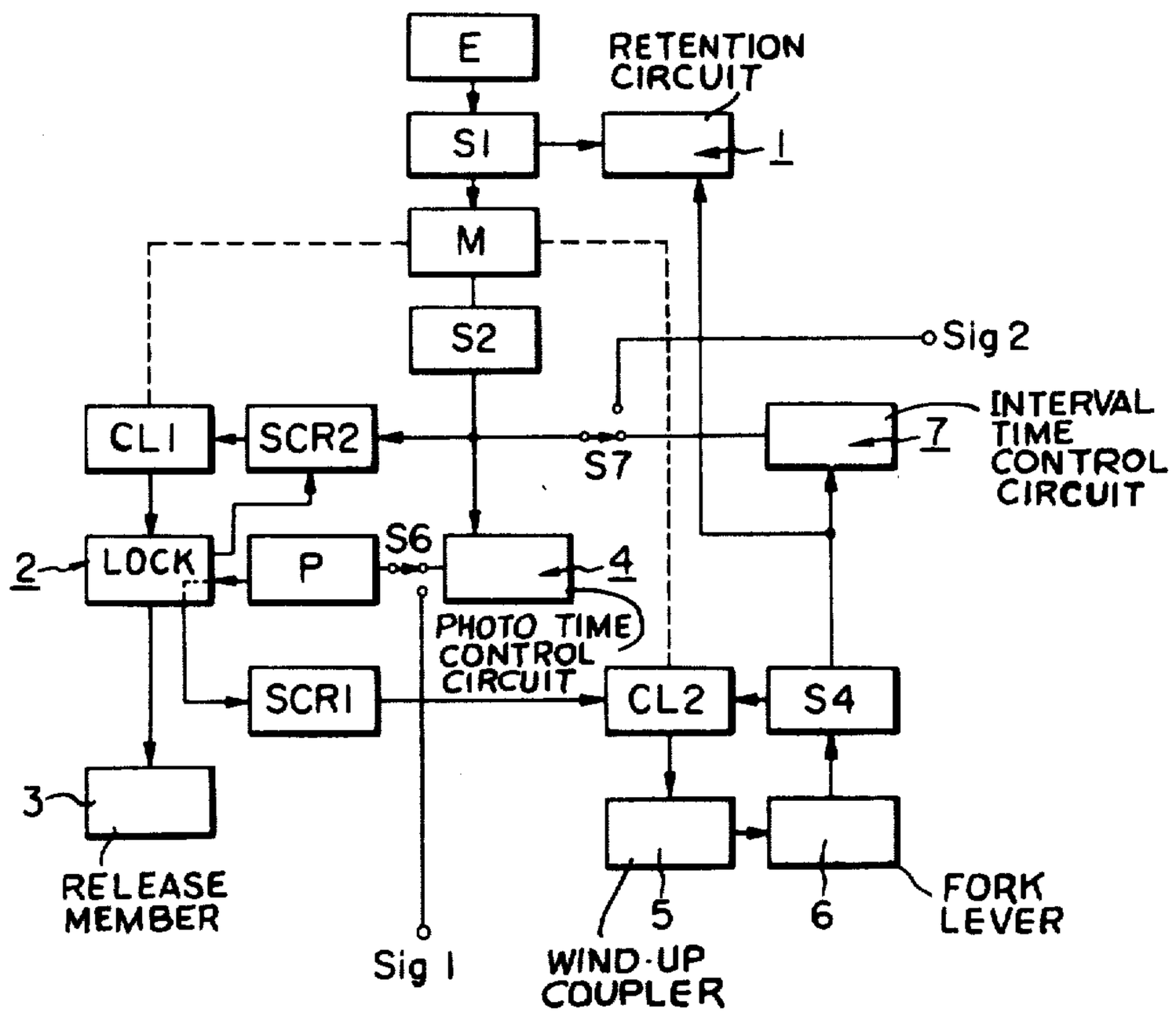


FIG. 1

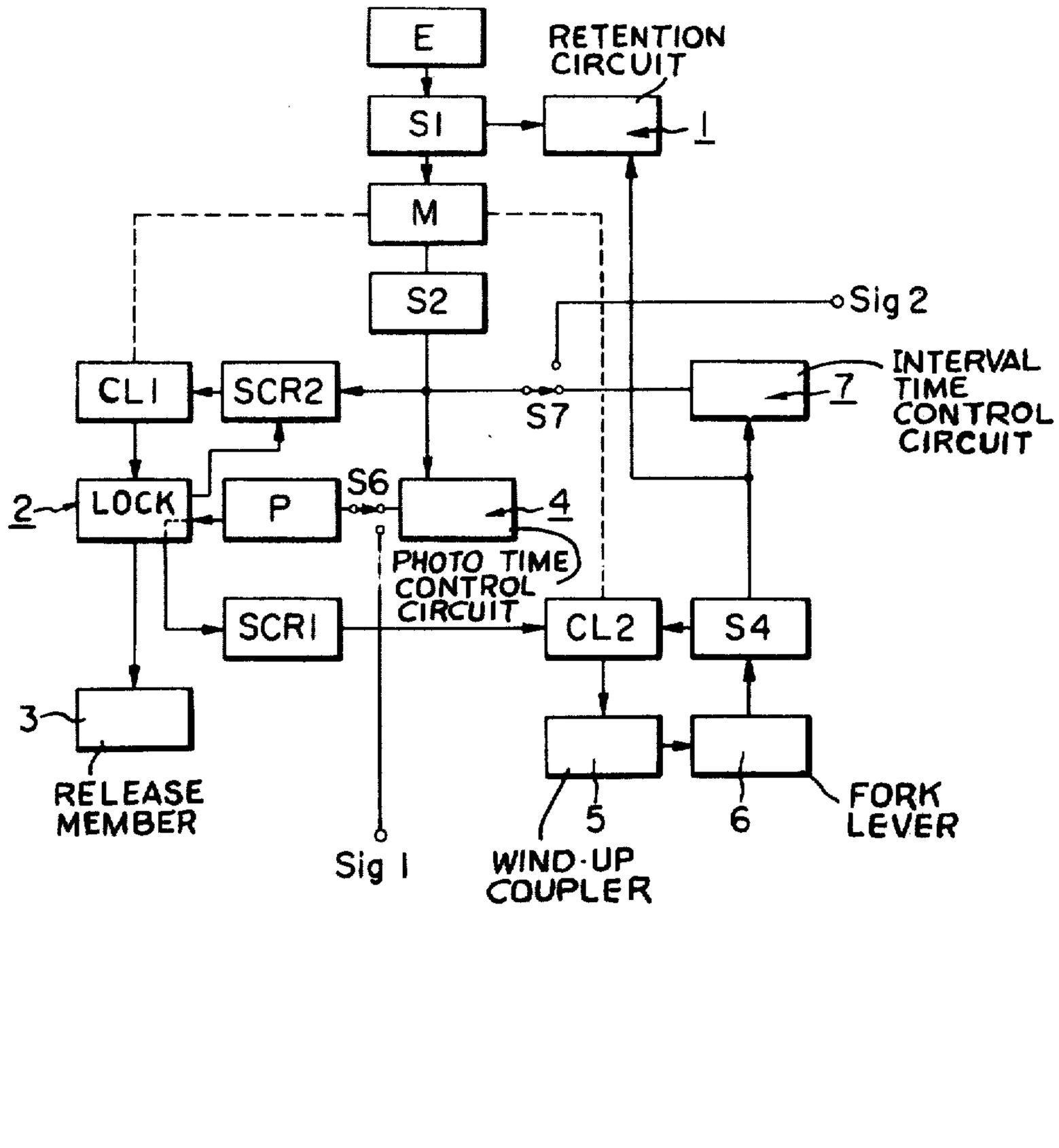

E
RETENTION CIRCUIT
S1
1
M
S2
Sig 2
CL1
SCR2
S7
7
INTERVAL TIME CONTROL CIRCUIT
2
LOCK
P
S6
4
PHOTO TIME CONTROL CIRCUIT
SCR1
CL2
S4
3
RELEASE MEMBER
5
6
FORK LEVER
Sig 1
WIND-UP COUPLER

FIG. 2

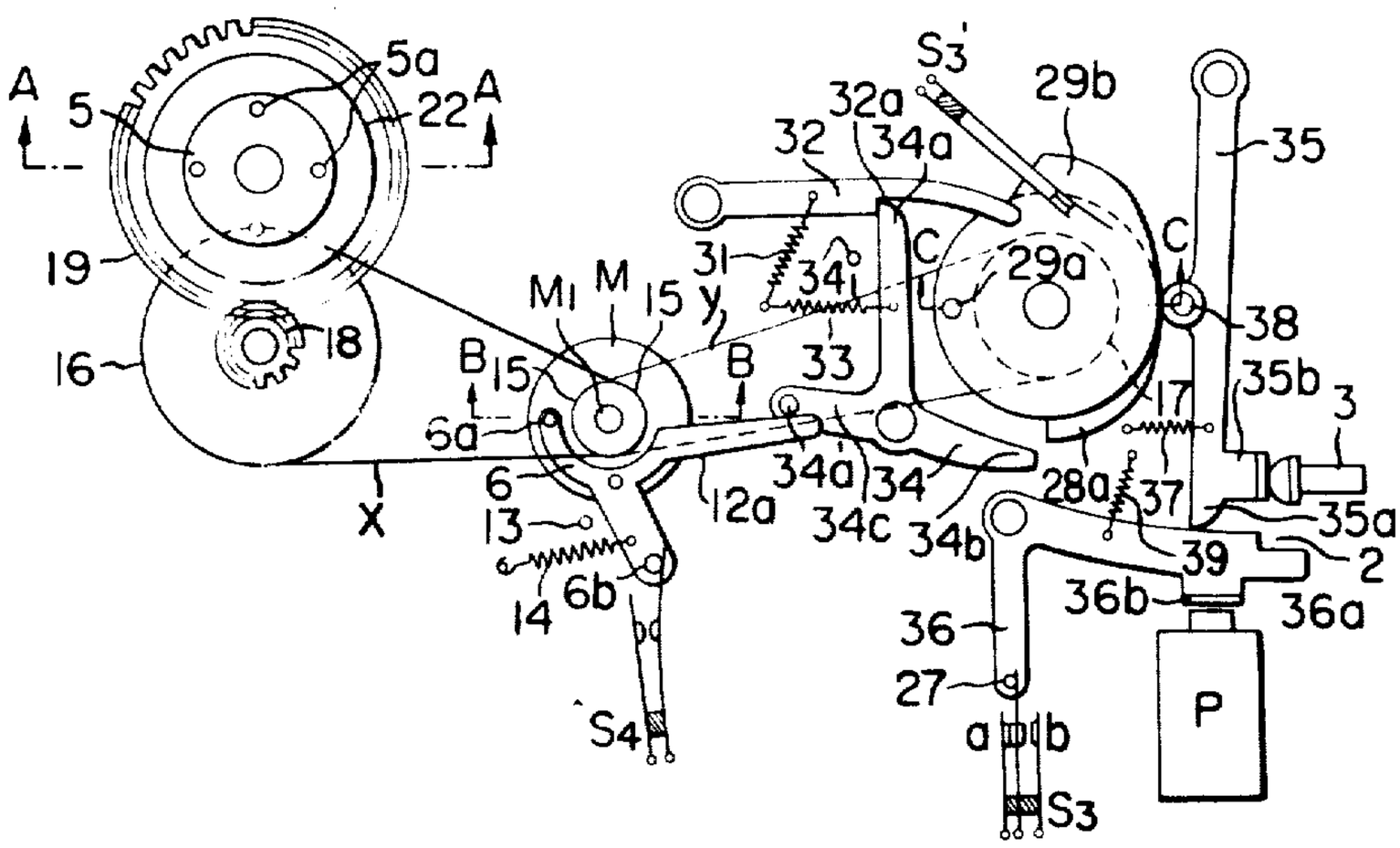


FIG. 3

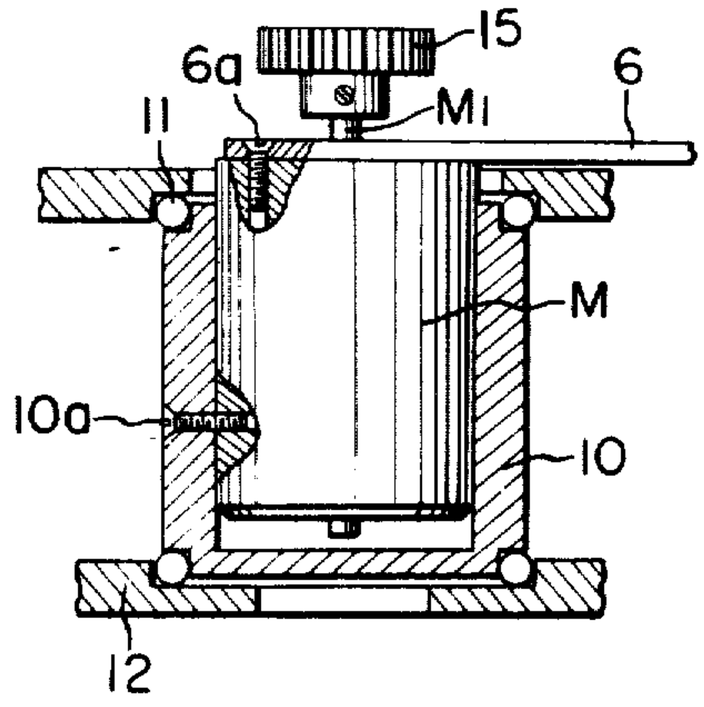
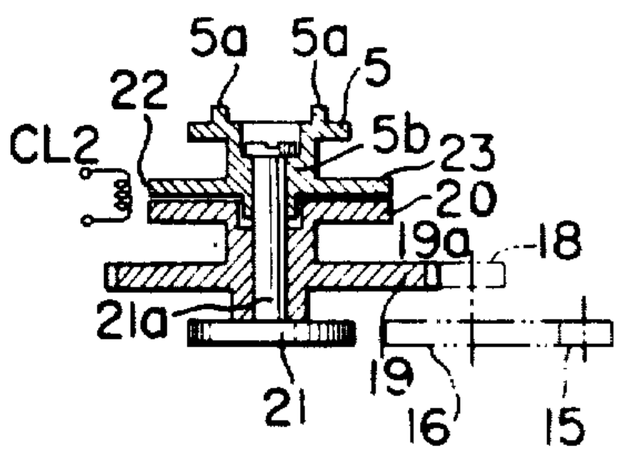


FIG. 4

FIG. 5



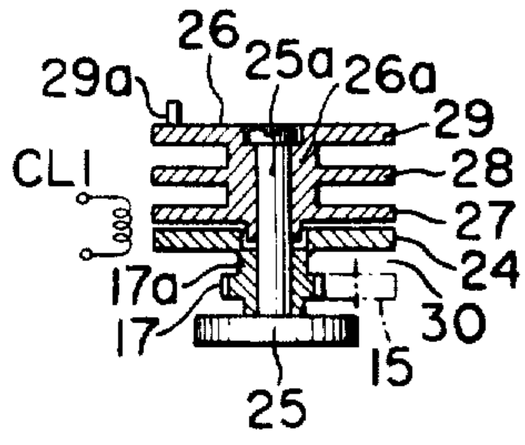


FIG. 6

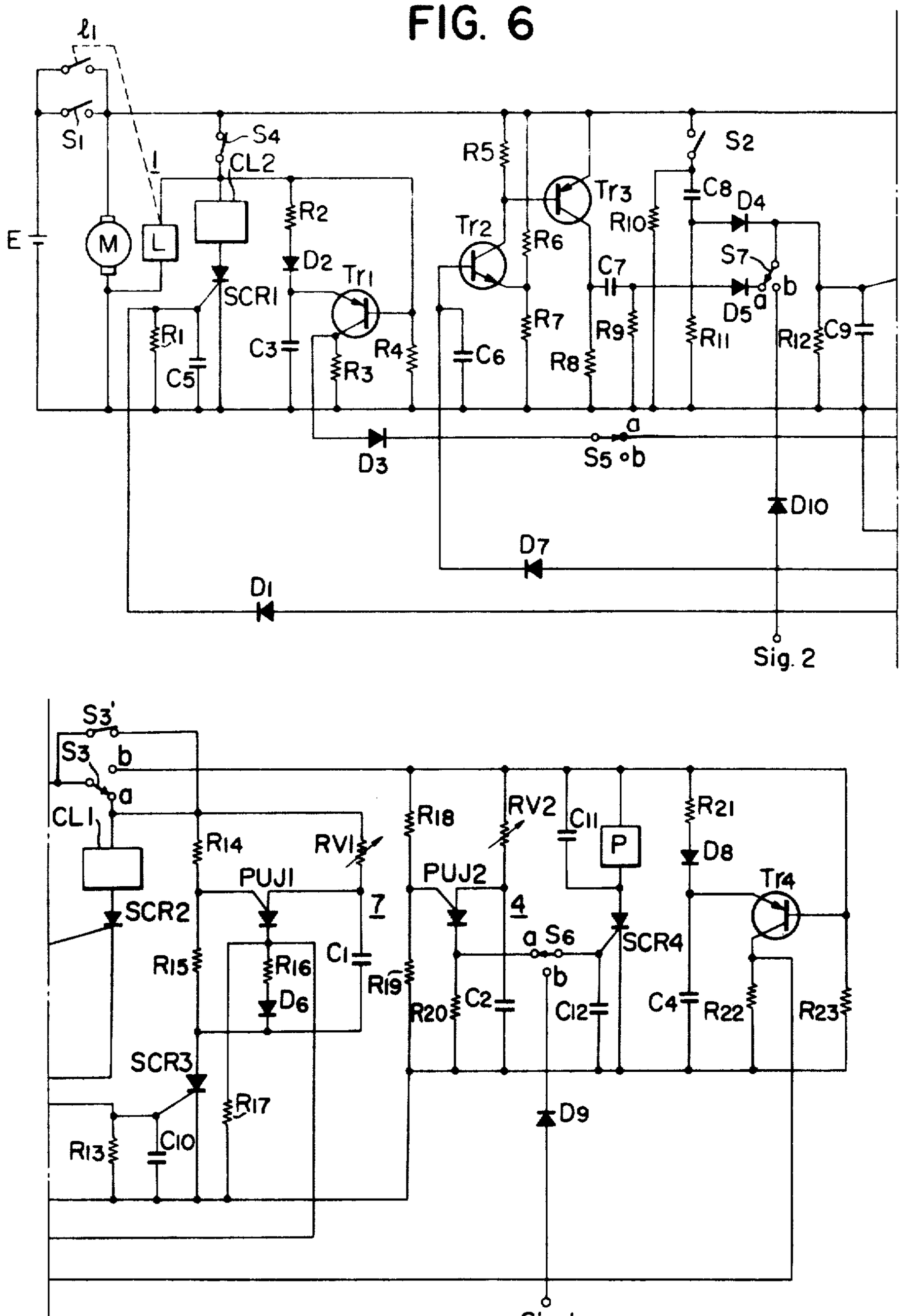

l1
S1
S4
CL2
R5
S2
Tr3
C8
D4
R10
Tr2
R6
S7
C7
R2
D2
Tr1
SCR1
D5
a
b
E
M
L
R1
C5
C3
R3
R4
C6
R7
R8
R9
R11
R12
C9
D3
S5
D10
D7
D1
Sig. 2
S3'
S3
CL1
R14
RV1
R18
RV2
C11
P
R21
D8
Tr4
PUJ1
PUJ2
SCR2
SCR4
S6
R15
R16
C1
D6
R19
R20
C2
C12
C4
R22
R23
SCR3
R17
R13
C10
D9
Sig. 1

FIG. 7a

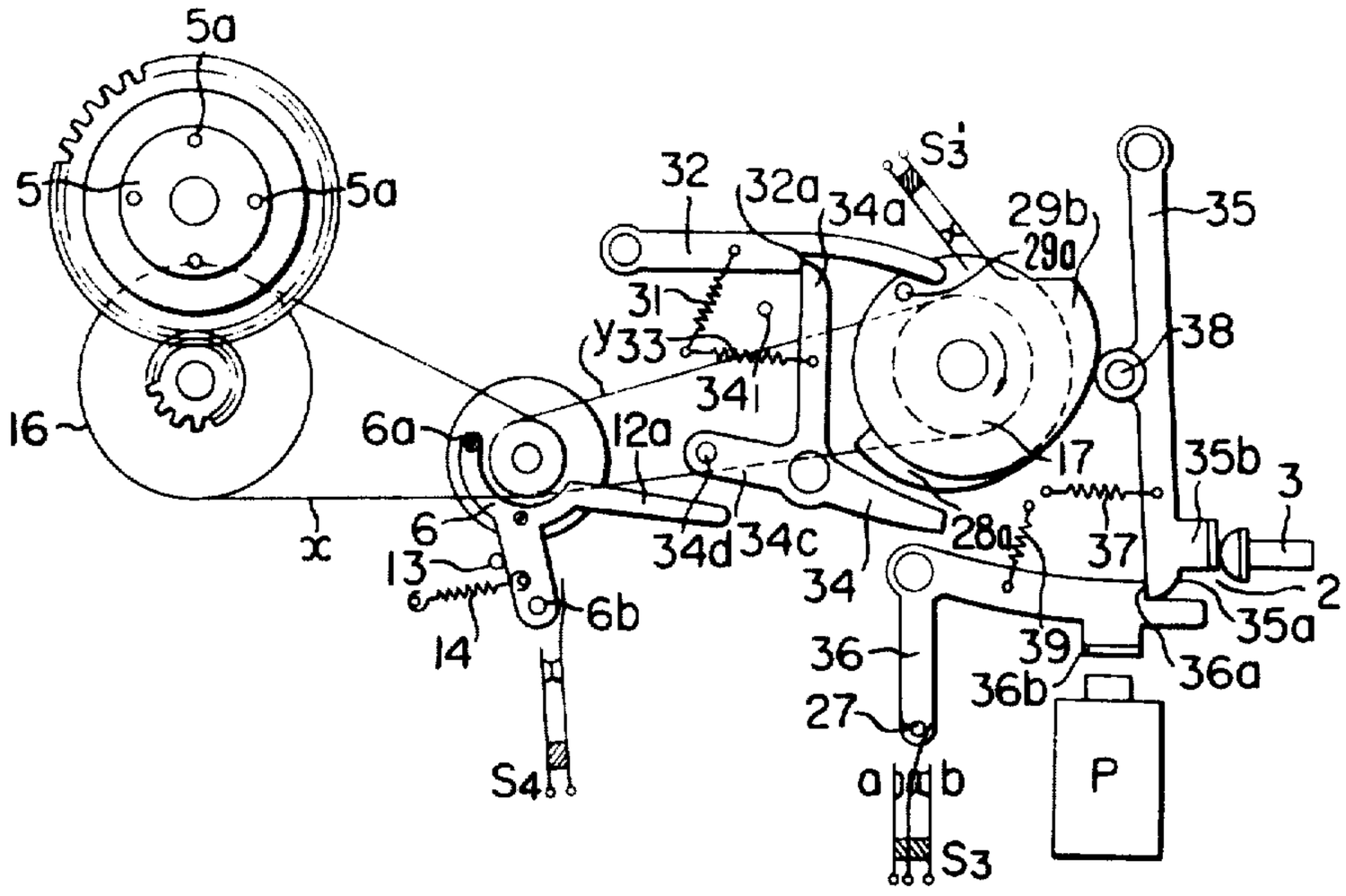

5a
5
5a
32
32a
34a
S3'
29b
35
29a
31
y
33
38
341
16
6a
12a
17
35b
3
6
34d
34c
28a
37
x
13
34
2
6b
35a
14
36
39
36a
36b
27
a
b
P
S4
S3

FIG. 7b

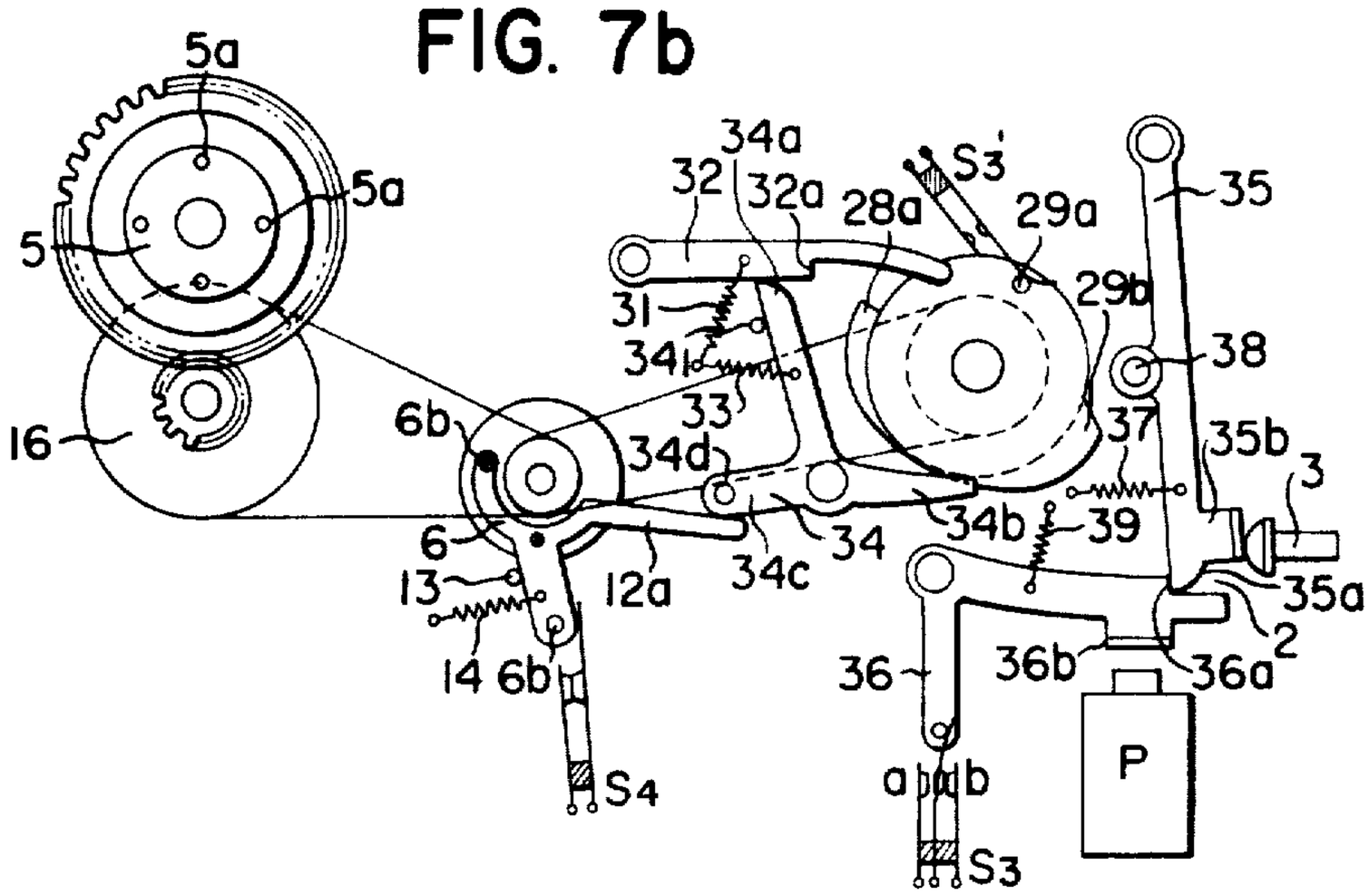

5a
34a
32
32a
28a
S3'
35
5
5a
29a
29b
31
38
341
33
37
35b
16
6b
34d
3
34b
39
6
34
34c
13
12a
35a
2
14
6b
36
36b
36a
a
b
P
S4
S3

FIG. 7c

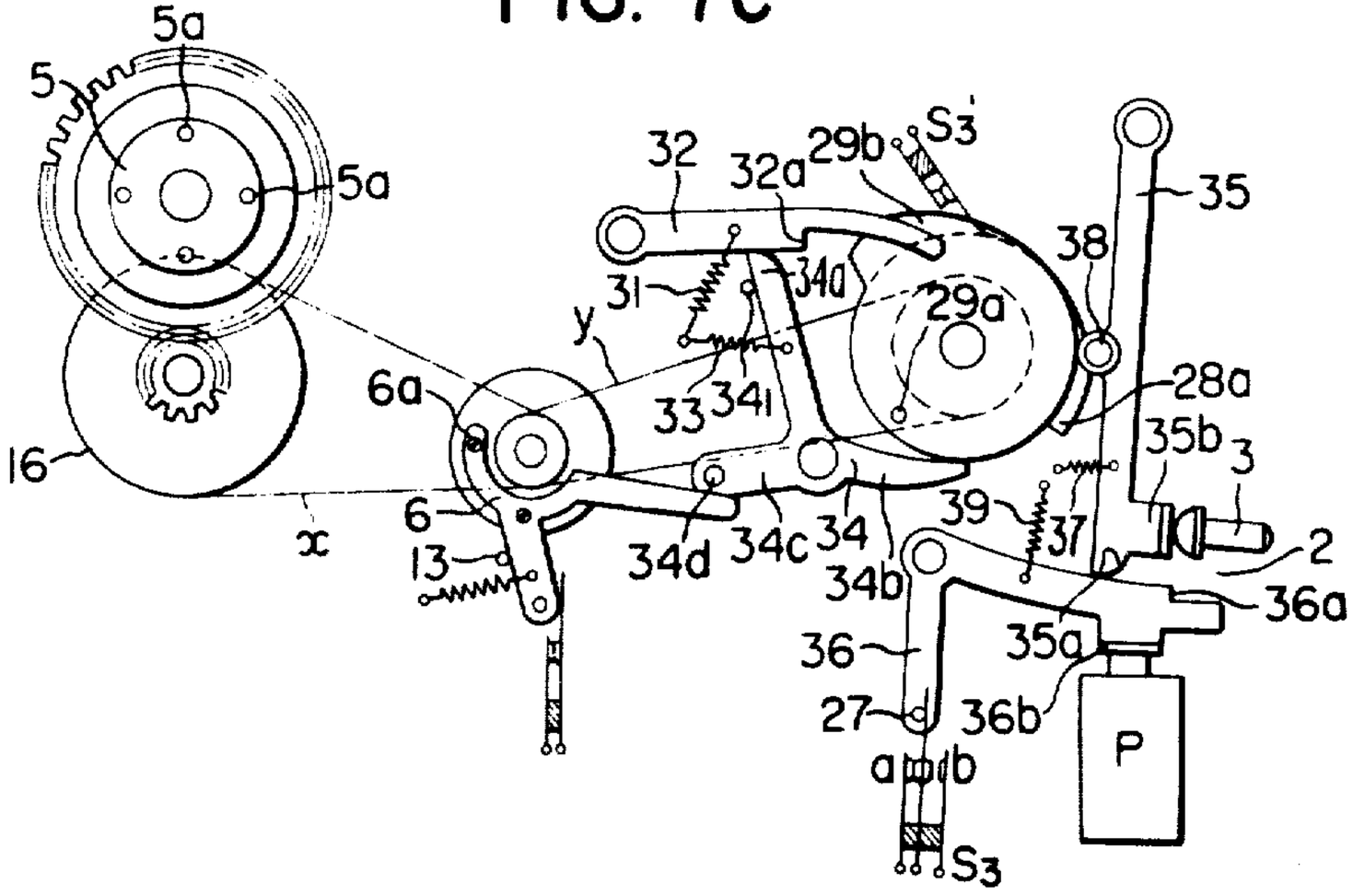
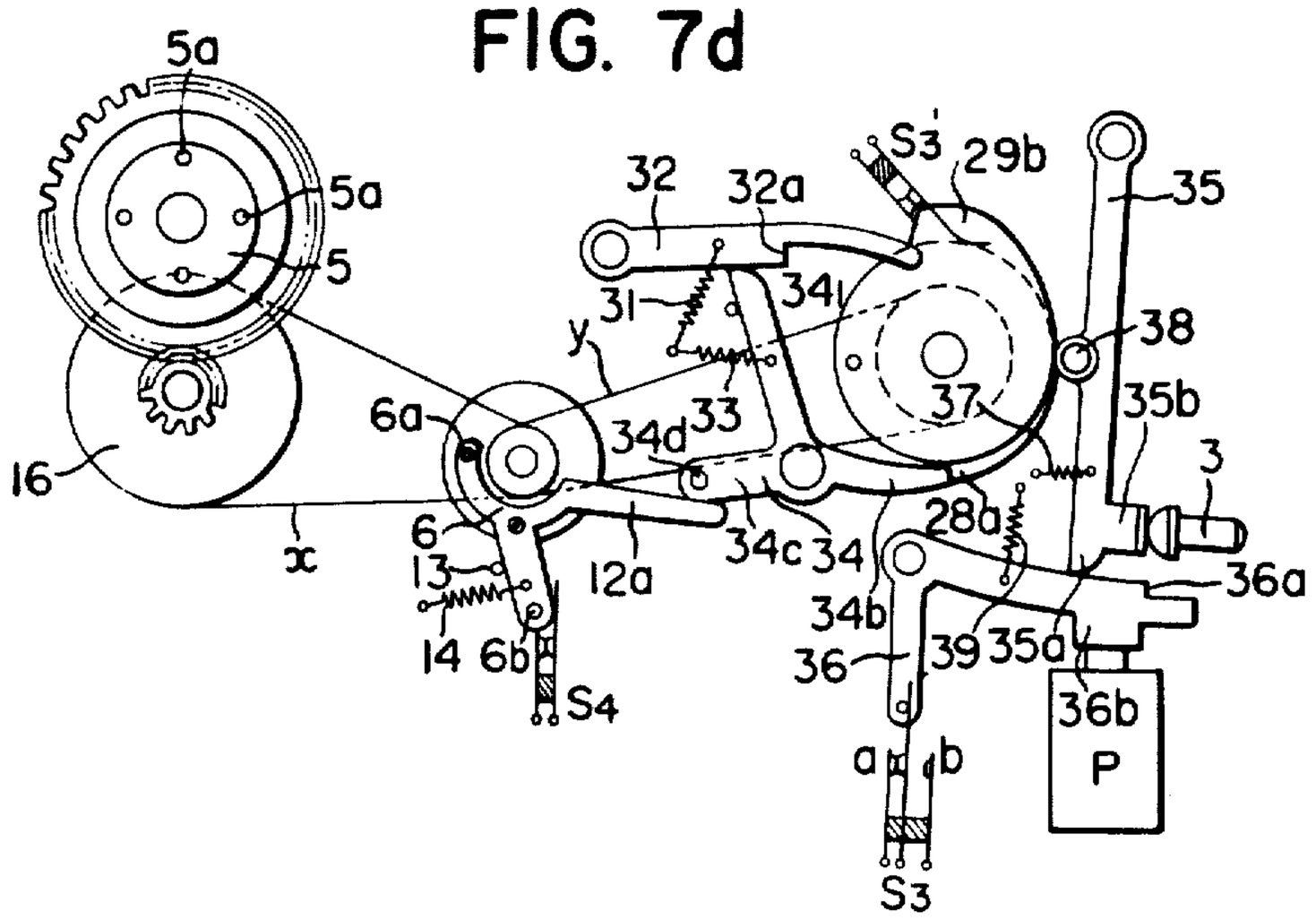

5a
5
5a
16
x
6a
6
13
y
32
32a
29b
S3
31
34a
29a
33
34
35
38
28a
35b
3
2
39
37
34d
34c
34b
36a
36
35a
27
36b
a
b
P
S3

FIG. 7d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5a
5
16
x
6a
6
13
14
6b
S4
y
32
32a
S3
29b
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34
33
34d
37
35
38
35b
3
28a
34c
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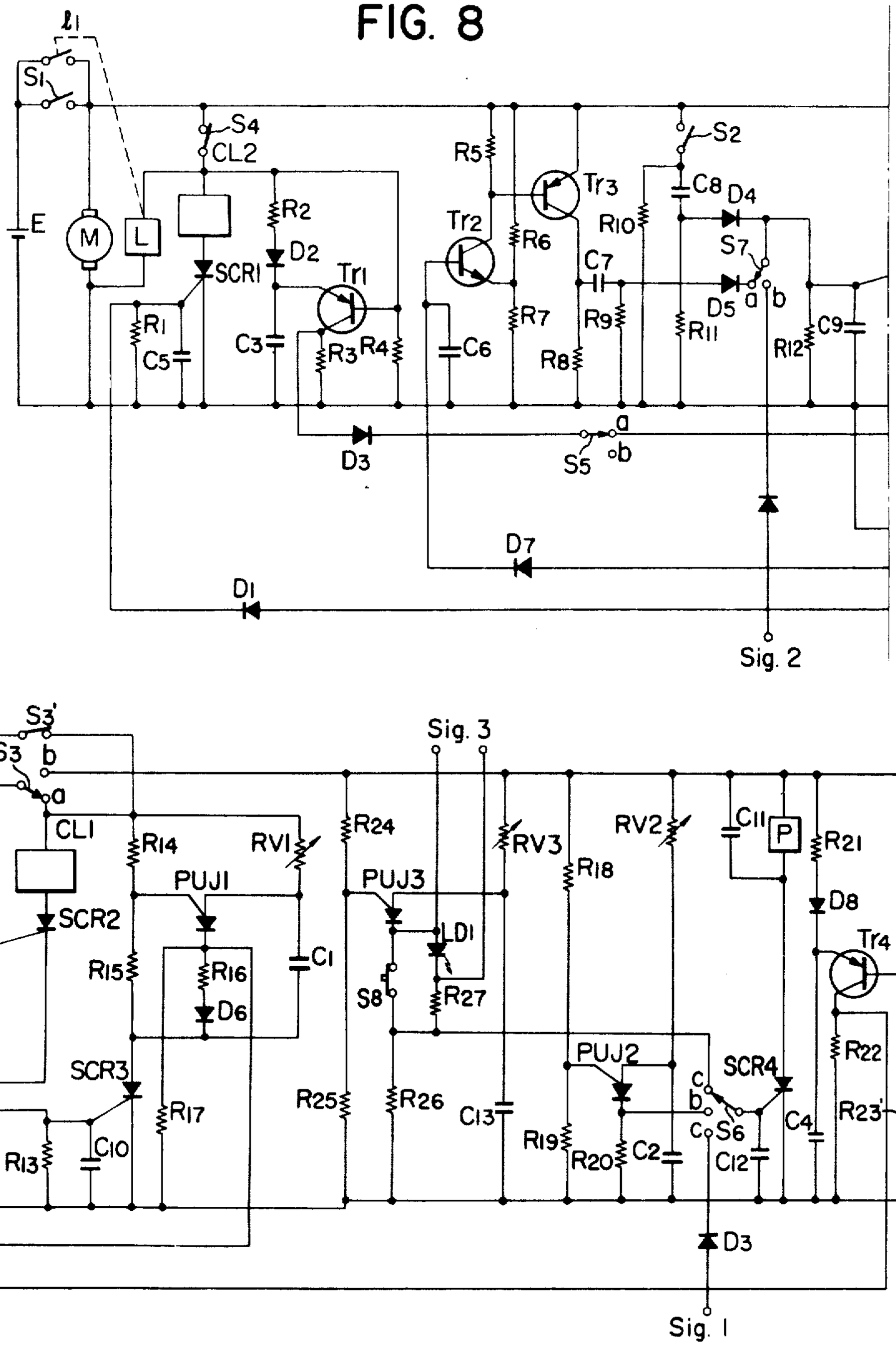
34b
36a
36
39
35a
36b
P
a
b
S3

FIG. 8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S1
E
M
L
S4
CL2
R2
D2
SCR1
R1
C5
C3
Tr1
R3
R4
D3
R5
Tr2
R6
R7
C6
R8
Tr3
S2
C8
D4
R10
S7
C7
R9
D5
a
b
R11
R12
C9
S5
D7
D1
Sig. 2
S3'
S3
CL1
R14
RV1
PUJ1
SCR2
R15
R16
D6
C1
SCR3
R17
R13
C10
Sig. 3
R24
PUJ3
LD1
S8
R27
RV3
R18
RV2
C11
P
R21
D8
Tr4
R22
R23'
R25
R26
C13
PUJ2
SCR4
c
b
S6
R19
R20
C2
C12
C4
D3
Sig. 1

FIG. 9

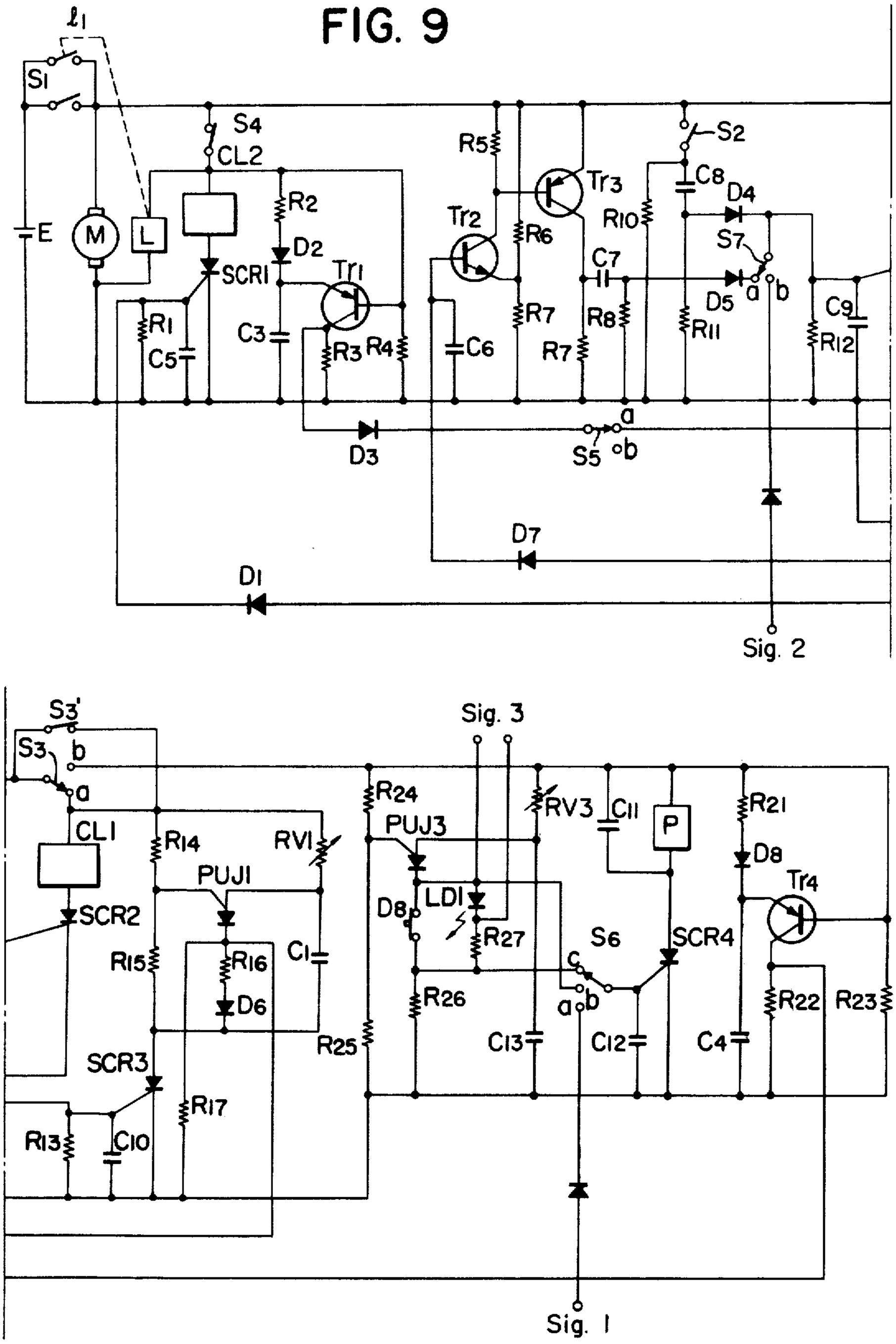
l1
S1
S4
CL2
R2
D2
SCR1
Tr1
R1
C5
C3
R3
R4
E
M
L
R5
Tr2
Tr3
R6
R7
C6
R7
R8
S2
C8
D4
R10
S7
C7
D5
a
b
R11
C9
R12
D3
S5
a
b
D7
D1
Sig. 2
Sig. 3
S3'
S3
b
a
CL1
R14
RV1
PUJ1
SCR2
R15
R16
D6
C1
R25
SCR3
R17
R13
C10
R24
PUJ3
D8
LD1
R27
R26
RV3
C11
P
C13
C12
S6
c
a
b
SCR4
R21
D8
Tr4
C4
R22
R23
Sig. 1

FIG. 10A

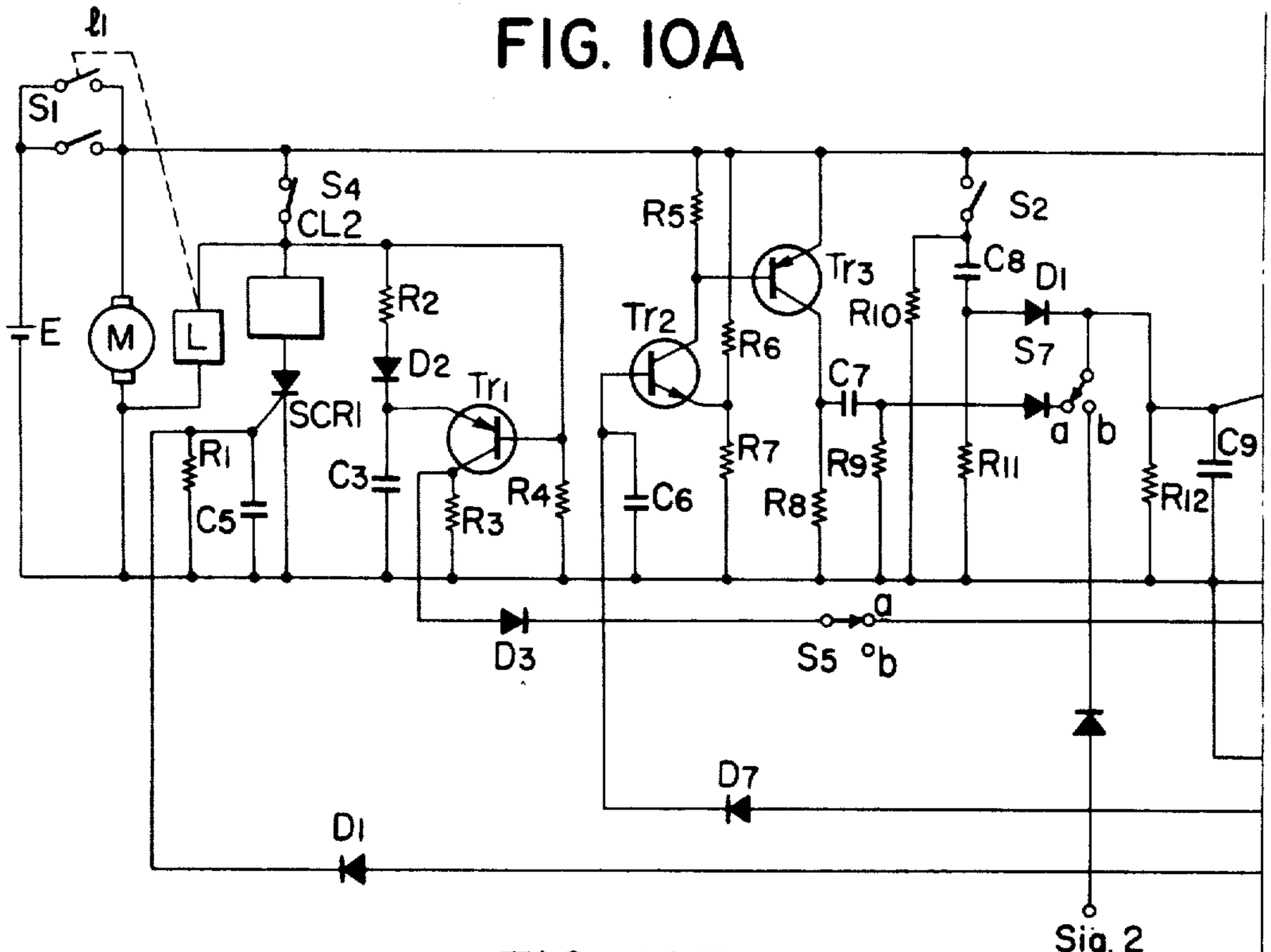

FIG. 10B

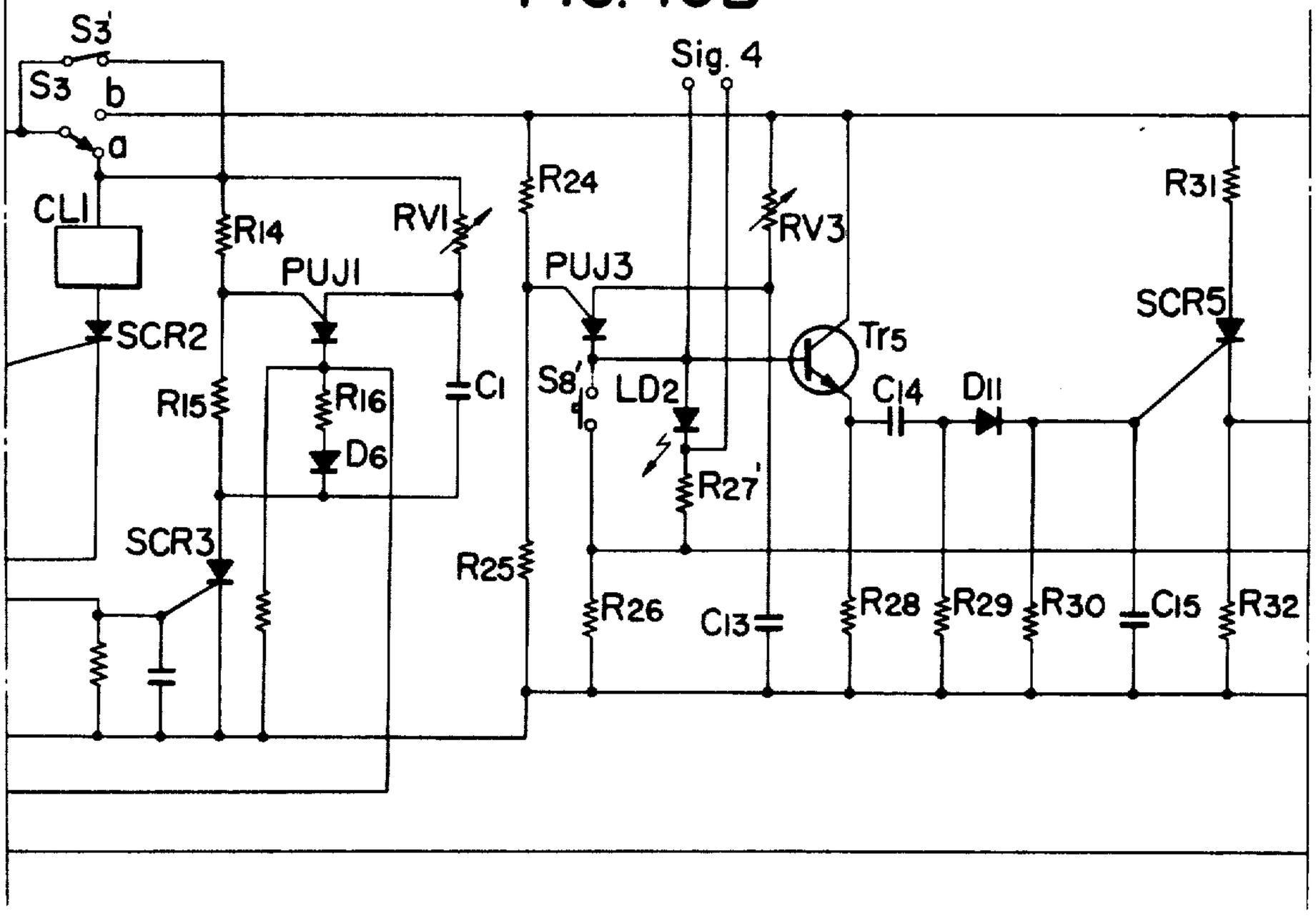

FIG. IOC

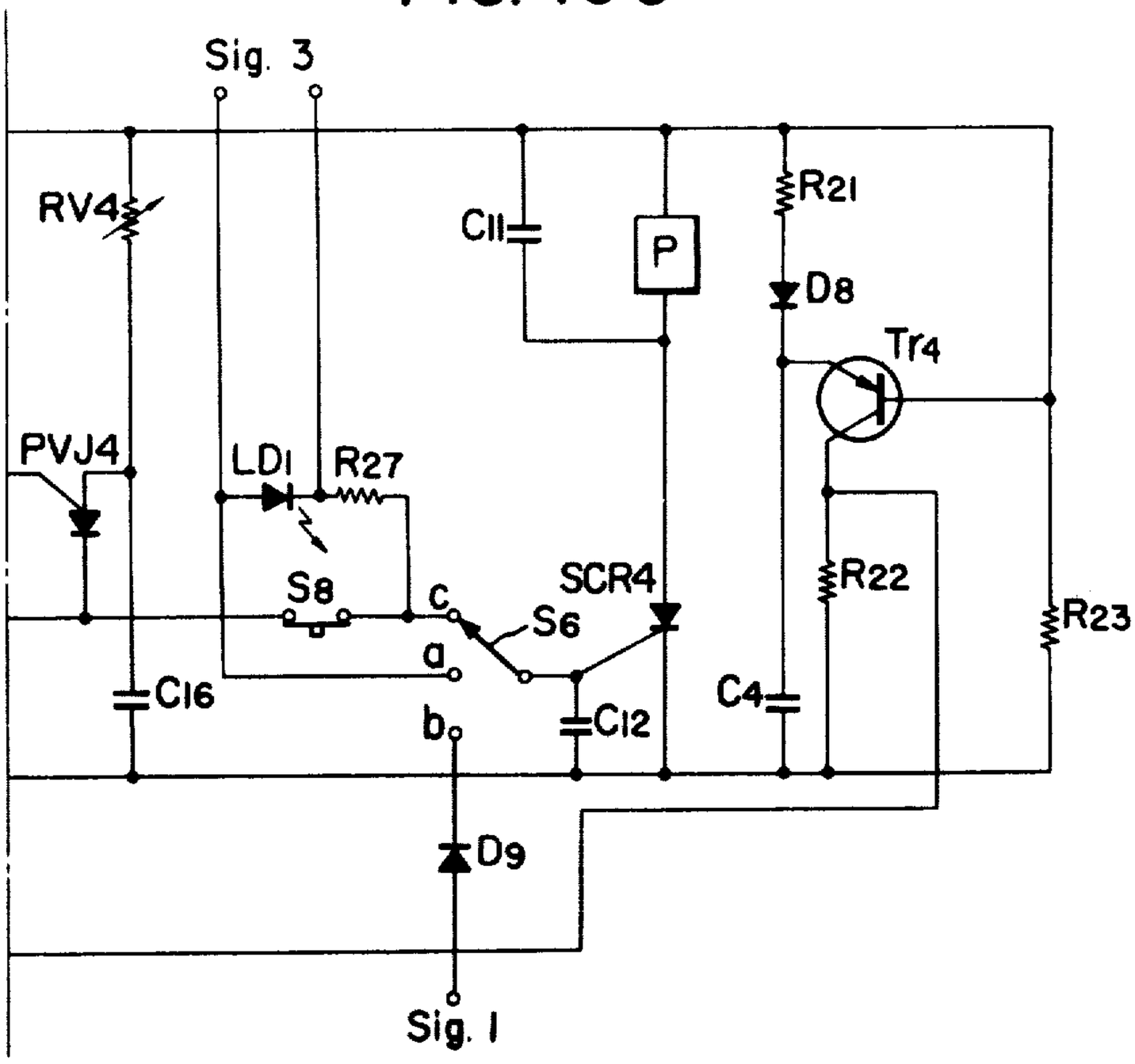

FIG. IOA	FIG. IOB	FIG. IOC

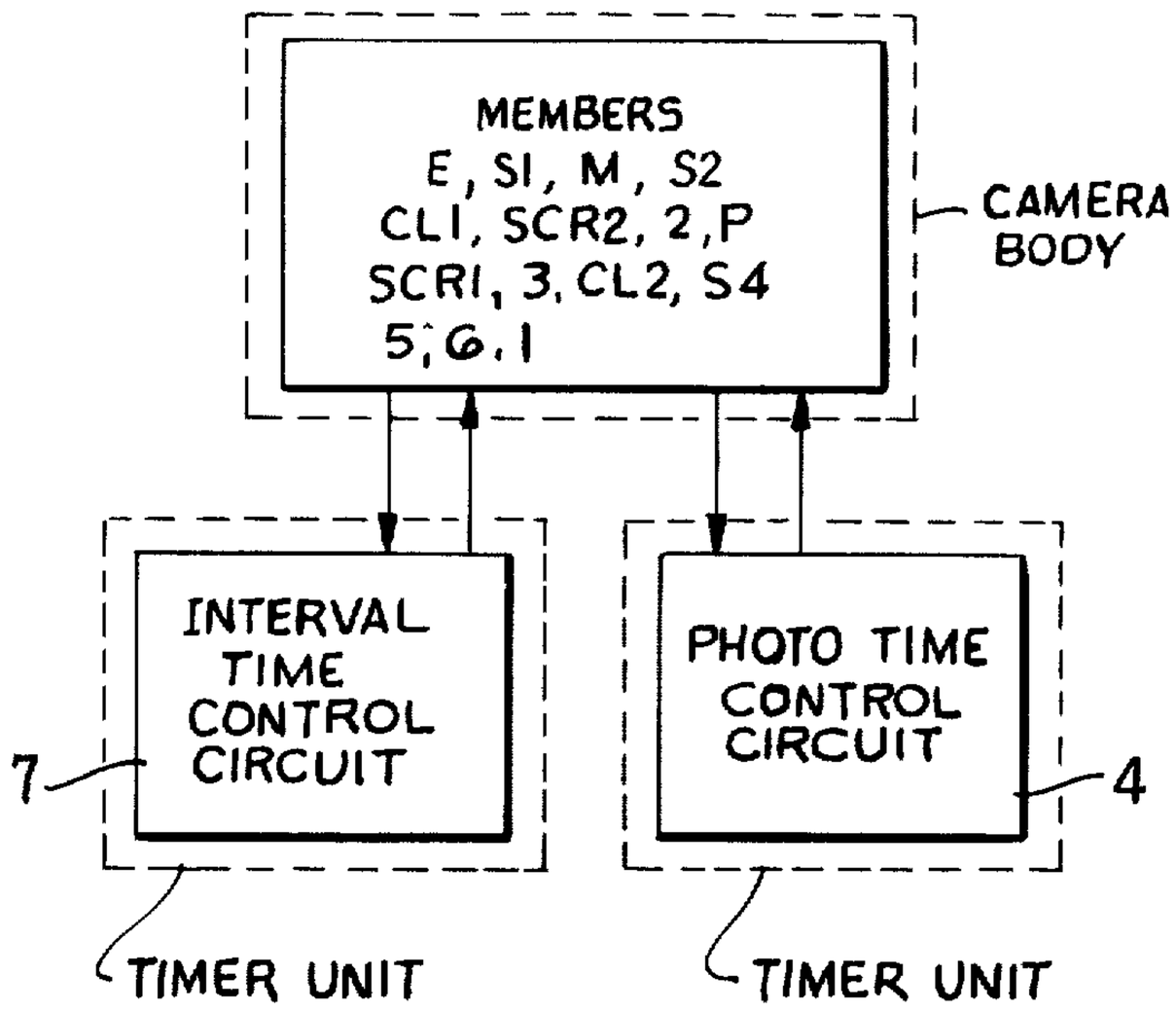
MEMBERS
E, S1, M, S2
CL1, SCR2, 2, P
SCR1, 3, CL2, S4
5, 6, 1
CAMERA BODY
INTERVAL TIME CONTROL CIRCUIT
7
PHOTO TIME CONTROL CIRCUIT
4
TIMER UNIT
TIMER UNIT

FIG. 11

ELECTRIC CONTROL DEVICE FOR A CAMERA

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

The present invention relates to an electric control device for a camera, particularly to an electric control device for a camera suitable for a motor drive system.

Heretofore an electric control device employing a motor drive system is to stop a driving motor at the time shutter wind up is completed, therefore time is required for the starting of the motor for the next photographing thus high speed continuous photographing cannot be done. And as a motor drive system to continuously actuate a camera, there is known a drive clock system to conduct photographing holding the photographing cycle from shutter release starting till starting of next shutter release at a predetermined length of time, and a shutter clock system to vary the above mentioned photographing cycle corresponding to exposure time. Therefore, when shutter speed of a camera is manually pre-set, the exposure time becomes uniform, thus it inevitably becomes a drive clock, while in an EE camera in which shutter speed is automatically determined especially in an EE camera in which diaphragm is given preference, exposure time changes in each photographing thus it becomes a shutter clock. However, even in EE photographing, when such objects changing every second are photographed as in sports photographing, a drive clock is effective, and on the other hand when such objects as having their brightness sharply changed, a shutter clock is effective. Because of this in EE photographing by a motor drive such camera has been desired as having both drive clock and shutter clock.

The first object of the present invention is to provide an electric control device for a camera in which the shutter release wind up is repeated while rotation of motor is continued at the time of continuous photographing to that high speed continuous photographing can be done easier than before.

The second object of the present invention is to provide an electric control device of a camera in which photographing cycle is easily controlled by an external trigger terminal utilizing for example light, sound, electric wave, etc.

The third object of the present invention is to provide an electric control device for a camera in which wide range of shutter speed can be used depending on exposure conditions.

The fourth object of the present invention is to provide an electric control device for a camera in which four different modes of use can be made as one frame photographing and continuous photographing each by hand holding and by remote.

The fifth object of the present invention is to provide an electric control device for a camera having both a drive clock system and a shutter clock system.

The sixth object of the present invention is to provide an electric control device for a camera having a means to indicate whether a drive clock system or a shutter clock system is in use at the time of photographing.

The seventh object of the present invention is to provide an electric control device for a camera in which

range of use of a drive clock is enlarged by providing a plural number of shutter timers.

The eighth object of the present invention is to provide an electric control device for a camera having a means to indicate the shutter timer which is in action corresponding to each shutter speed when plural number of shutter timers are provided.

The ninth object of the present invention is to provide an electric control device for a camera in which a number of semi-conductors are used in the electric control circuit to hold the number of mechanical switches to the minimum required for enhancing reliability.

BRIEF EXPLANATION OF DRAWINGS

FIG. **1** is a block arrangement diagram showing an example of the present invention.

FIG. **2** shows an arrangement of a driving mechanism of the camera in FIG. **1**.

FIG. **3** is a cross sectional view to show the way the motor in FIG. **2** is supported.

FIG. **4** is a cross sectional view to show a shutter wind up coupler of FIG. **2**.

FIG. **5** is a cross sectional view to show a rotation member for shutter release control of FIG. **2**.

FIG. **6** is a circuit diagram to show an electric control circuit of the camera in FIG. **1**.

FIG. **7**a, b, c, d are circuit diagrams to show functional states of FIG. **2**.

FIG. **8** is a circuit diagram to show a first modification example of the photographing time control circuit shown in FIG. **2**.

FIG. **9** is a circuit diagram to show a second modification example of the photographing time control circuit shown in FIG. **2**.

FIGS. **10**A, **10**B and **10**C is a circuit drawing to show a third modification example of the photographing time control circuit shown in [FIG. **2**.] *FIG. 1.*

FIG. 11 is a block diagram arrangement illustrating the time control units as separate units from the main body of the camera.

Now an example of the present invention shall be explained referring to the drawings. FIG. **1** is to show an outline of the device by a block diagram, wherein E is a power source, S_1 is a switch for placing the power source E in association with the first step action of a release button not shown in the drawing, and a power source self retention circuit **1** becomes ON as said switch S_1 becomes ON, and at the same time a motor M rotates. S_2 is a switch which is linked with the second step action of a release button not shown in the drawing. As this switch S_2 becomes ON, a second thyrister SCR_2 becomes ON, also placing a first electro-magnetic clutch coil CL_1 in ON state, thereby a lock mechanism **2** is actuated by the motor M, locking the release member **3** and starting shutter releasing. Said second thyrister SCR_2 is made OFF by said lock signal to make the first electro-magnetic clutch coil CL_1 OFF, and at the same time the photographing time control circuit **4** is actuated placing an electro-magnet P in ON state after a lapse of T_1 second, and the lock of the release member **3** by the above lock mechanism **2** is released to complete the release. The first thyrister SCR_1 is made ON by this lock release signal to place the second electro-magnet clutch coil CL_2 in ON state, thereby a wind up coupler **5** is actuated by the motor M to conduct wind up of shutter. Y-shape fork lever **6** is actuated by completion of shutter wind up to place the switch S_4 in OFF state momentarily, placing the above mentioned second elec-

tro-magnetic clutch coil CL_2 in OFF state, and at the same time a photographing time control circuit 7 is actuated, placing the above mentioned second thyrister SCR_2 in ON state after a lapse of T_2 seconds, thereafter same process as above is repeated to perform continuous photographing action. When the above mentioned power source E self retention circuit 1 is placed in OFF state by a momentary OFF action of the switch S_4, one frame photographing can be made. S_6 is a switch to make change over between the photographing time control circuit 4 and an external signal supplied from the terminal Sig. 1. S_7 is a switch to make change over between the photographing interval time control circuit 7 and an external signal supplied from the terminal Sig. 2.

Now concrete explanations shall be made on FIG. 1, and first the driving mechanism of a camera shall be explained by FIG. 2. M, 2, P, 3, 5, 6, S_4 are a motor, a lock mechanism, a release member, an electro-magnet, a wind up coupler, Y-shape fork lever, a switch, respectively shown in FIG. 1. The motor M is fixed to a holder 10 by screw 10a as shown in FIG. 3, and the holder 10 is rotatably attached to a case 12 by bearing 11. A Y-shape forked lever 6 which is biassed in a clockwise direction by a spring 14 to the position of a stopper 13 always is attached to a stator of said motor M by a screw 6a. This motor M is so made as being rotated integrally with the Y-shape forked lever 6 against the spring 14 when the reaction of the motor M is momentarily increased. A pin 6b is provided at one end of the Y-shape forked lever 6 and a movable contact of the switch S_4 of constantly closed type is made to engage with said pin 6b, and when the Y-shaped forked lever 6 is rotated in a counter-clockwise direction, the movable contact leaves a fixed contact placing the switch S_4 in OFF state. A first gear 15 is attached to a rotating axle M_1 of said motor M, and second and third gears 16, 17 are engaged with the first gear, but in [FIG. 1] *FIG. 2* for convenience of explanation they are linked together with belts x and y. A fifth gear 19 engages as shown in FIG. 4, as a last wind up gear, with a fourth gear 18 being installed coaxially with said second gear 16. An electro-magnetic clutch plate 20 is installed coaxially 19a with said fifth gear 19, and an extension axle 21a of a disk 21 installed to the case 12 is inserted inside the axle 19a, and the axle 19a is made rotatable against the extension axle 21a. An electro-magnetic clutch plate 22 provided at one end of a wind up coupler 5 is positioned at a position corresponding to the electromagnetic clutch plate 20, and a projected part 5a provided at the other end plane of the wind up coupler 5 engages with an engaging member of a camera not being shown in the drawing. A forward end of the extension axle 21a of the disk 21 is inserted into an axle 5b of a wind up coupler 5, and said forward end of the extension axle 21a is made rotatable against the wind up coupler 5. And electro-magnetic clutch plates 20 and 22 forming second electro-magnetic clutch 23 are so opposed to each other as being separated by a predetermined distance. The second electro-magnetic clutch coil CL_2 is placed adjacent to said electro-magnetic clutch 23, wherein the electro-magnetic clutch plates 20, 22 are coupled together when said second electro-magnetic clutch coil CL_2 is conducted through. And an electro-magnetic clutch plate 24 is attached to the third gear 17 to their co-axle 17a, and an extension axle 25a of a disk 25 installed to the case 12 is inserted inside the axle 17a, wherein the axle 17a is rotatable against the extension axle 25a. An

electro-magnetic clutch plate 27 of a release control rotating member 26 is placed against the electro-magnetic clutch plate 24. This rotating member 26 consists of an electro-magnetic clutch plate 27 and a stop cam 28 having an engaging part 28a, and a release cam 29 having a riser part 29a being placed co-axially 26a. And a forward end of the extension axle 25a of the disk 25 is inserted in the axle 26a of the rotating member 26, and is rotatable against the extension axle 25a. The electro-magnetic clutch plates 24 and 27 forming the first electro-magnetic clutch 30 are so opposed against each other as being separated by a predetermined distance. A first electro-magnetic clutch coil CL_1 is placed being adjacent to said electro-magnetic clutch 30, wherein when the first electro-magnetic clutch coil CL_1 is conducted through, the electro-magnetic clutches 24 and 27 are coupled together. And a forward end of a lever 32 is biassed by a spring 31 in a clockwise direction and has a stepped part 32a at its center is placed on a release cam 29. This lever 32 is rotated in a counter-clockwise direction by being pushed with a pin 29b provided on the release cam 29, and an end part 34a of T-shape lever 34 being biassed in a counter-clockwise direction by a spring 33 engages with the stepped part 32a of said lever 32. This T-shape lever 34 is so made as having its engagement with the stepped part 32a released by the rotation of the lever 32 in a counter-clockwise direction, and being rotated in a counter-clockwise direction to the position of the stopper 34_1. When this T-shape lever 34 is rotated in a counter-clockwise direction its end part 34b engages with the engaging part 28a of the stopper cam 28. And a pin 34d is provided at an end part 34c of the T-shape lever 34, wherein the T-shape lever 34 is rotated in a clockwise direction by pushing the pin 34d with the rotation of the above mentioned lever 32, and the end part 34a of the T-shape lever 34 is made to engage with the stepped part 32a of the lever 32. 2 is a lock mechanism composed of a release lever 35 and an engaging lever 36, and the release lever 35 is biassed in a clockwise direction by a spring 37 with its one end serving as an axial support part, and a roller 38 provided at a center of the lever 35 is made to contact with the release cam 29 by the biassing power of the spring 37. The other end 35a of said release lever 35 is so made as engaged with a stepped part 36a provided at one end of an engaging lever 36 in L-shape having a bent part used as an axial support part. This engaging lever 36 is biassed in a counter-clockwise direction by spring 39, and an electro-magnet P is provided near one end of the engaging lever 36, wherein when the magnet P is in action a steel plate part 36b at one end of the engaging lever 36 is attracted by the electro-magnet P, releasing the lock between the other end 35a of the release lever 35 of the lock mechanism 2 and the stepped part 36a of the engaging lever 36, to rotate the release lever 35 in a clockwise direction. A movable contact of the switch S_3 is engaged at the other end of the engaging lever 36, and the movable contact of the switch S_3 is changed over to b side of the fixed contact when the engaging lever 36 and the release lever 35 are locked, on the other hand when the lock between the engaging lever 36 and the release lever 35 is released the movable contact of the switch S_3 is changed over to a of the fixed contact. And a movable contact of a switch S_3' of constantly closed type is provided on the release cam 29 behind said lever 32, wherein when this movable contact is pushed by the pin 29a, the movable contact of the switch S_3' is separated from the fixed contact to place

the switch S_3' in OFF state. And a release member **39** which is linked with the release lever **35** is provided at the projection part **35b** at the other end of the release lever **35**.

Next, explanations shall be made on the electric control circuit for a camera shown in FIG. **1** by referring to FIG. **6**, wherein the same parts as in FIG. **1** and FIG. **2** will be identified by the same reference numbers or marks. F is a direct current power source, and to both ends of the power source E, a relay contact l_1 is connected in parallel while a power source switching in switch S_1 which is linked with the first step action of a release button which is not shown in the drawing and the motor M are connected in series. The switch S_4 of ordinarily closed type, the second electro-magnetic clutch coil CL_2, and the first thyrister SCR_1 in an ordinary direction are connected in series between the connecting point (hereinafter called point A at positive potential side) between the switch S_1 and the motor M, and the negative potential side of the power source E. This second electro-magnetic clutch coil CL_2 is placed in conductive state when the first thyrister SCR_1 becomes ON. The gate of the first thyrister SCR_1 is connected to the negative potential side of the power source E through the resistor R_1 to which a capacitor C_5 is connected in parallel. The connecting point between the switch S_4 and the second electro-magnetic clutch coil CL_2 is connected to the negative potential side of the power source E through the resistor R_2, a diode D_2 in an ordinary direction, and a capacitor C_3 in series. The connecting point between the switch S_4 and the second electro-magnetic clutch coil CL_2 is connected to the base of the first transistor Tr_1. The base of said first transistor Tr_1 is connected to the negative potential side of the power source E through the resistor R_4, and the collector is connected to the negative potential side of the power source E through the resistor R_3, while the emitter is connected to the above mentioned diode D_2 and the capacitor C_3. This first transistor Tr_1 is placed in ON state by electric charge of the capacitor C_3 when the switch S_4 becomes OFF. A power source self-retention circuit (⊥), comprising the above mentioned relay contact l_1, the switch S_4, the relay L being connected in series, is connected to the both ends of the power source E. And the point A at positive potential side is connected to the negative potential side of the power source E through the switch S_2, which are linked with the second step action of the release button with the capacitor C_8, the resistor R_{11} being connected in series. The connecting point of said switch S_2 and the capacitor C_8 is connected to the negative potential side of the power source E through the resistor R_{10}. Also the point A at the positive potential side is connected to the movable contact of the switch S_3, and the fixed contact a of the switch S_3 is connected to the negative potential side of the power source E through the first electro-magnetic clutch CL_1, the second thyrister SCR_2 in ordinary direction in series. This first electro-magnetic clutch CL_1 is placed in conductive state when the second thyrister SCR_2 becomes ON. The gate of said second thyrister SCR_2 is connected to the negative potential side of the power source E through the resistor R_{12} to which a capacitor C_9 is connected in parallel. The connecting point between the capacitor C_8 and the resistor R_{11} is connected to the gate of the second thyrister SCR_2 through the diode D_4 in ordinary direction. The point A at positive potential side is connected to the negative potential side of the

power source E through resistor R_6 and the resistor R_7 in series, and the connecting point between said resistor R_6 and the resistor R_7 is connected to the emitter of the second transistor Tr_2. The base of the second transistor Tr_2 is connected to the negative potential side of the power source E through the capacitor C_6, and its collector is connected to the point A at the positive potential side through the resistor R_5, further the collector is connected to the base of the third transistor Tr_3. The emitter of said third transistor Tr_3 is connected to the point A at the positive potential side, and its collector is connected to the negative potential side of the power source E through the resistor R_8, further the collector is connected to a fixed contact a of the switch S_7 through the capacitor C_7, and the diode D_5 in ordinary direction in series. Said third transistor Tr_3 is placed in ON state as the second transistor Tr_2 is placed in ON state. The connecting point of the capacitor C_7 and the diode D_5 is connected to the negative potential side of the power source E through the resistor R_9. The fixed contact b of said switch S_7 is connected to the external signal input terminal Sig. **2**, while the movable contact of the switch S_7 is connected to the gate of the above mentioned second thyrister SCR_2. Said second thyrister SCR_2 will be placed in ON state when the plus pulse at the time when the third transistor Tr_3 is placed in ON state or the external signal from the terminal Sig. **2**, by selection with the switch S_7, is supplied. The point A at the positive potential side is connected to the negative potential side of the power source E through the switch S_3', the resistor R_{14}, the resistor R_{15}, and the third thyrister SCR_3 in an ordinary direction in series. The connecting point between the switch S_3' and the resistor R_{14} is connected to the connecting point between the fixed contact a of said switch S_3 and the first electro-magnetic clutch coil CL_1, while the connecting point between the switch S_3 and the resistor R_{14} is connected to the anode of the above mentioned third thyrister SCR_3 through the first variable resistor RV_1 and the capacitor C_1 in series. The connecting point between the above mentioned first variable resistor RV_1 and the first capacitor C_1 is connected to the anode of a first programable unijunction (hereinafter called PUJ), wherein the gate of the PUJ_1 is connected to the connecting point between the above mentioned resistor R_{14} and the resistor R_{15}, and the cathode of the PUJ_1 is connected to the anode of the above mentioned third thyrister SCR_3 through the resistor R_{16} and the diode D_6 in ordinary direction in series. The cathode of the PUJ_1 is connected to the negative potential side of the power source E through the resistor R_{17}, further the cathode is connected to the base of the above mentioned second transistor Tr_2 through the diode D_7 in ordinary direction. This PUJ_1 is placed in ON state after lapse of such length of time as determined by the first variable resistor RV_1 and the capacitor C_1, placing the second transistor Tr_2 in ON state. The photographing interval time control [circuit **2**] *circuit 7* comprises the resistor R_{14}, the resistor R_{15}, the first variable resistor RV_1, the capacitor C_1, and the PUJ_1. And the gate of the third thyrister SCR_3 is connected to the negative potential side through the resistor R_{13} to which the capacitor C_{10} is connected in parallel. The gate of the third thyrister SCR_3 is connected to the fixed contact a of the switch S_5 having the fixed contacts a and b, and the collector of the above mentioned first transistor Tr_1 is connected to the movable contact of said switch S_5 through the diode D_3 in ordinary direction. This third thyrister SCR_3 is

placed in ON state when the first transistor Tr_1 becomes ON. And the fixed contact b of the above mentioned switch S_3 is connected to the negative potential side of the power source E through the resistor R_{18}, and the resistor R_{19} in series. The fixed contact b of the switch S_3 is connected to the negative potential side of the power source E through the second variable resistor RV_2 and the capacitor C_2 in series. The connecting point between the second variable resistor RV_2 and the capacitor C_2 is connected to the anode of the second programable uni-junction (hereinafter called PUJ). The gate of this PUJ_2 is connected to the connecting point between the above mentioned resistor R_{18} and the resistor R_{19}. The cathode of this PUJ_2 is connected to the negative potential side of the power source E through the resistor R_{20}, and the cathode of PUJ_2 is connected to the fixed contact a of the switch S_6. The PUJ_2 will be placed in ON state after a lapse of such length of time as determined by the second variable resistor RV_2 and the capacitor C_2. The photographing time control circuit **4** comprises the resistor R_{18}, the resistor R_{16}, the second variable resistor RV_2, the capacitor C_2, and the PUJ_2. The external signal input terminal Sig. **1** is connected to the fixed contact b of the switch S_6 through the diode **9** in ordinary direction. The movable contact of said switch S_6 is connected to the gate of the fourth thyrister SCR_4. The gate of the fourth thyrister SCR_4 is connected to the negative potential side of the power source E through the capacitor C_{12}, and its cathode is connected to the negative potential side of the power source E, while its anode is connected to the fixed contact b of the above mentioned switch S_3 through the electro-magnet P to which the capacitor **11** is connected in parallel. Said fourth thyrister is placed in ON state when either the plus pulse as PUJ_2 becomes ON or the external signal from the terminal Sig. **1** is supplied to the gate by selection with the switch S_6. The electromagnet P becomes ON when the fourth thyrister is placed in ON state. And the fixed contact b of the switch S_3 is connected to the negative potential side of the power source E through the resistor R_{21}, the diode D_8, and the capacitor C_4 in series. The connecting point between said diode D_8 and the capacitor C_4 is connected to the emitter of the fourth transistor Tr_4, and the base of said fourth transistor is connected to the fixed contact of the switch S_3 while its base is connected to the negative potential side of the power source E through the resistor R_{23}. The collector of said fourth transistor Tr_4 is connected to the negative potential side of the power source E through the resistor R_{22}, and the collector is connected to the gate of the above mentioned first thyrister SCR_1 through the diode D_1. This fourth transistor Tr_4 is placed in ON state by the electric charge of the capacitor C_4 when the movable contact of the switch S_3 is changed over from the fixed contact a to the fixed contact b, wherein the first thyrister SCR_1 is placed in ON state when the fourth transistor TR_4 becomes ON.

Next the function of the above mentioned set-up shall be explained starting with the explanation of the case for continuous photographing. The movable contacts of the switches S_5, S_6, S_7 are changed over to the fixed contact a side, and the driving mechanism of a camera is at first almost in a state shown in FIG. **2**, wherein the movable contact of the switch S_3 has been changed over to the fixed contact a side, and the switch S_3' is in ON state, and the switch S_4 becomes ON. First, when the switch S_1 becomes ON by the first step action of a release button which is not shown in the drawing, the motor M starts rotating and at the same time, the power source self-retention circuit **1** functions, that is the relay L becomes conductive placing the relay contact l_1 in ON state, and self-retaining the power source E. And as the switch S_2 becomes ON by the second step action of the release button, the plus pulse is given to the gate of the second thyrister SCR_2 through the diode D_4, thus the second thyrister SCR_2 becomes ON. Therefore, as the first electro-magnetic clutch coil CL_1 becomes conductive connecting the electro-magnetic clutch plates **24** and **27**, the release control rotating member **26** is rotated in a clockwise direction. Thereby the lock mechanism **2** functions, that is, the riser part **29a** of the release cam **29** pushes the release lever **35** through the roller **38**, therefore the release member **5** is pushed to start the shutter release and at the same time the end part **35a** of the release lever **35** engages with the stepped part **36a** of the engaging lever which is biased in a clockwise direction by the spring **39**, and is locked. By this locking the movable contact of the switch S_3 is changed over from the fixed contact a to the fixed contact b side. This state is shown in FIG. **7a**. And as the rotating part **26** continues rotation the pin **29a** rotates the lever **32**, which is biassed by the spring **31**, in a counterclockwise direction, releasing the engagement between the stepped part **32a** and the end part **34a** of the T-shape lever **34**. By the T-shaper lever **34** is rotated by the spring **33** in a counter-clockwise direction as far as the position of the stopper **34a**. Immediately after this the pin **29a** pushes the movable contact of the switch S_3' placing the switch S_3' momentarily in OFF state cutting off the conductance of the first electro-magnetic clutch coil CL_1. This state is shown in FIG. **7b**. Since the second thyrister SCR_2 becomes OFF by the momentary off of the switch S_3', the plus pulse is given to the gate again, and above mentioned first electro-magnetic clutch coil CL_1 will not be in conductive state until the second thyrister becomes ON. By this engagement between the electro-magnetic clutch plates **24** and **27** is released, but the rotating member **26** continues, as shown in FIG. **7d**, rotating by inertia until the engaging part **28a** of the stop cam **28** is engaged with the end part **34b** of the T-shape lever **34**. Also, as the movable contact of the above mentioned switch S_3 is changed over to the fixed contact b side, the photographing time control circuit **4** functions, and after a lapse of time T_1 (photographing time) which is determined by the second variable resistor RV_2 and the capcitor C_2, PUJ_2 becomes ON, therefore plus pulse is given from the cathode of the PUJ_2 to the gate of the fourth thyrister SCR_4, thus the fourth thyrister SCR_4 becomes ON placing the electro-magnet P in conductive state. By this, as the electro-magnet P attracts the engaging lever **36**, the locking of the lock mechanism **2** that is the engagement between the stepped part **36a** of the engaging lever **36** and the end part **35a** of the release lever **35** is released, returning the release lever **35** and the release member **5**, and completing the shutter release. This means completion of the exposure. At the same time the movable contact of the switch S_3 is changed over from the fixed contact b to the fixed contact a side. This state is shown in FIG. **7c**. By this, the electro-magnet P cuts off its connection with the power source E, but keeps ON state for a predetermined length of time by the electric charge of the capacitor C_{11}. At this time while the fourth transistor Tr_4 is in OFF state as the base electric potential is higher than the emitter electric potential when the movable contact of the switch S_3 is changed

over to the fixed contact b side, but as the movable contact of the switch S_3 is changed over to the fixed contact a side, the emitter electric potential becomes higher than the base electric potential by the electric charge of the capacitor C_4. Therefore the fourth transistor Tr_4 is in ON state. Because of this, the electric charge of the capacitor C_4 is discharged through the resistor R_{22}, and therefore the plus pulse is given to the first thyrister SCR_1 through the diode D_1, thus the first thyrister SCR_1 becomes ON, placing the second electro-magnetic clutch coil CL_2 in conductive state. By this, as the electro-magnetic clutch plates **20** and **22** are coupled together, the rotation of the motor M is transmitted to the wind up coupler **5** rotating the same performing the shutter wind up action. And when the shutter wind up action is completed, because of the increase of the output torque of the motor M its reaction increases momentarily. Therefore, the Y-shape forked lever **12** rotates in a clockwise direction against the spring **14**, placing the switch S_4 in OFF state momentarily and at the same time the pin **34**d of the T-shape lever **34** is pushed up, rotating the T-shape lever **34** to clockwise direction against the spring **34**, coupling the end part **34**a of the T-shape lever **34** and the stepped part **32**a of the lever **32**. By this the T-shape lever **34** has the engagement between its end part **34**b and the engaging part **28**a of the stop cam **28** is released, placing the rotating member **26** in a rotatable state. At the same time, as the switch S_4 momentarily becomes off, the second electromagnetic clutch coil CL_2 becomes OFF. By the momentary off of the switch S_4 the first thyrister SCR_1 becomes OFF, therefore the plus pulse is given to the gate again, thus the second electro-magnetic clutch coil CL_2 will not be in conductive state until the first thyrister SCR_1 becomes ON. Because of this, the coupling of the electro-magnetic clutch plates **20** and **22** is released, therefore the rotation of the motor M will not be transmitted to the wind up coupler **5**, thus the shutter wind up action will be stopped. Also, while the first [rransistor] *transistor* Tr_1 is placed in OFF state since the base electric potential becomes higher than the emitter potential when the switch S_4 is in ON state, the emitter electric potential becomes higher than the base electric potential by the electric charge of the capacitor C_3 when the switch S_4 momentarily becomes OFF, thus the first transistor Tr_1 becomes ON. By this the electric charge of the capacitor C_3 is discharged through the resistor R_3, and thus the plus pulse is given to the gate of the third thyrister SCR_3, placing the third thyrister SCR_3 in ON state. Therefore, the photographing interval time control circuit **2** functions and after a lapse of T_1 seconds (photographing interval) which is determined by the first variable resistor RV_1 and the capacitor C_1, PUJ_2 becomes ON, thus the plus pulse from the cathode of said PUJ_1 is given to the base of the second transistor Tr_2, placing the second transistor Tr_2 in ON state. By this the third transistor Tr_3 becomes ON, and the plus pulse is given to the gate of the second thyrister SCR_2 through the diode D_5, placing the second thyristor SCR_2 in ON state. Thus returning to the first state, and when the release button is kept being pushed, the first electro-magnetic clutch coil CL_1, the electro-magnet P, and the second electro-magnetic clutch coil CL_2 work in turn with the ratio of the photographing time T_1 and the photographing interval time T_2, thus continued photographing is done.

And as the release button is released the switches S_1 and S_2 become OFF, and at the time when the shutter

wind up is completed the switch S_4 becomes OFF, then the conductance to the relay L is cut off and the relay contact l_1 becomes OFF, thus the power source self retention is not done, and the motor M is stopped and all function is stopped.

Next, explanations shall be made on the case when one frame photographing is done. In this one frame photographing while the movable contact of the switch S_5 is changed over to the fixed contact b, the setting of other switches is same as that in the continuous photographing, therefore explanation of such portion as having same function as in the continuous photograhing shall be omitted. After the shutter release wind up, the plus pulse from the first transistor Tr_1 will not reach the third thyrister SCR_3 as the switch S_5 is changed over to the fixed contact b side. Because of this for making photographing again the release button is once released placing the switches S_1, S_2 in OFF state, then the release button is pushed again placing the switches S_1, S_2 in ON state to conduct photographing.

And the photographing time T_1 second may be so determined as corresponding to the brightness using a photo-conductive element such as CdS, etc., instead of the second variable resistor RV_2.

Also about the photographing time T_1, the movable contact of the switch S_6 is changed over to the fixed contact b side, and instead of the signal by the second variable resistor RV_2, the capacitor C_2, such external signals as light, sound, electric wave, etc. being supplied from the terminal Sig. **1** may be used to control the fourth thyrister SCR_4. For example when a Braun tube CRT is photographed, the fourth thyrister SCR_4 may be placed in ON state by a sweeping completion signal, to complete exposure.

Similarly, about the photographing interval time T_2 second, the movable contact of the switch S_7 is changed over to the fixed contact b side, and instead of the signal by the first variable resistor, the capacitor C_1 such external signals as light, sound, electric wave, etc. supplied by the terminal Sig. **2** may be used to control the second thyrister SCR_2 to work the first electro-magnetic clutch coil CL_1.

The electric control device in which both the photographing time control device and the photographing interval control device mentioned above are composed by timer circuits may be so made as a separate unit from a camera main body, *as shown in FIG. 11.*

As a modified example of the photographing time control circuit **4** of the present invention, the photographing time T_1 second may be so determined as corresponding to the film exposure time as shown in FIG. **8**. Explanations on the parts corresponding to those shown in FIG. **6** are omitted. That is, the fixed contact b of the switch S_3 is connected to the negative electric potential side of the power source E through the third variable resistor RV_3 and the capacitor C_{13} intervened in series, and the fixed contact b of the switch S_3 is connected to the negative potential side of the power source E through the resistor R_{24} and the resistor R_{25} intervened in series. The connecting point between the resistor R_{24} and the resistor R_{25} is connected to the gate of a third programable uni-junction (hereinafter called PUJ), and the anode of this PUJ_3 is connected to the connecting point between the above mentioned third variable resistor RV_3 and the capacitor C_{13}, while the cathode of said PUJ_3 is connected to the negative potential side of the power source E through the switch S_8 and the resistor R_{26} which become ON by the film expo-

sure completion signal intervened in series, and the cathode of said PUJ_3 is further connected to the fixed contact c of the switch S_6 through the luminous diode LD_1 and the resistor R_{27} intervened in series. The fixed contact point c of switch S_6 is connected to the connecting point between the above mentioned switch S_8 and the resistor R_{26}. And a terminal Sig. **3** for giving an indication of the luminous diode LD_1 at outside is taken out of the both ends of the luminous diode LD_1. In such set-up, when the movable contact of the switch S_6 is changed over to the fixed contact c side and the movable contact of the switch S_3 is changed over to the fixed contact b side by the locking of the lock mechanism **2**, the PUJ_3 becomes ON with such time T seconds as will be determined by the third variable resistor RV_3 and the capacitor C_{13}. If the exposure of film has been completed at this time, the switch S_8 becomes ON, therefor the plus pulse from the cathode of the PUJ_3 is given to the gate of the fourth thyrister SCR_4 through the switch S_8, the switch S_6, placing said fourth thyrister SCR_4 in ON state. At this time photographing is done by a drive clock. When the exposure of film has not been completed the switch S_8 is in OFF state, therefore the luminous diode LD_1 radiates light until film exposure is completed, then the switch S_8 becomes ON after completion of film exposure, thereby the plus pulse from the cathode of the PUJ_3 is given to the gate of the fourth thyrister placing said fourth thyrister in ON state. At this time photographing is made by a shutter clock. At this time by suitably selecting the values of the capacitor C_{13} and the resistor R_{27} the reduction of the electric charge at the capacitor C_3 by the luminescence of the luminous diode LD_1 is held to very small amount.

And when the circuit comprising the resistor R_{18}, the resistor R_{19}, the second variable resistor RV_2, the capacitor C_2, the PUJ_2 is made a long time timer circuit, while the circuit comprising the resistor R_{24}, the resistor R_{25}, the third variable resistor RV_3, the capacitor C_{13}, PUJ_3 is made a shutter timer circuit, said long time timer circuit and the shutter timer circuit can be served by one timer circuit as shown in FIG. **9**. That is, the long time timer circuit in FIG. **8** is removed and the anode of the luminous diode LD_1 may be connected to the fixed contact b of the switch S_6. The case when the plural number for example two of the shutter timer circuit shown in FIG. **9** are used will be shown in FIG. **10**, and the explanations for the same portion as in FIG. **6** shall be omitted. That is, the cathode of the PUJ_3 is connected to the fixed contact c of the switch S_6 through the switch S_8' which becomes ON by film exposure completion signal and the switch S_8 which becomes ON also by film exposure completion signal. The connecting point between the switch S_8' and the switch S_8 is connected to the negative potential side of the power source E through the resistor **26**. A series circuit composed of the luminous diode LD_2 and the resistor R_{27}' is connected in parallel with said switch S_8'. A terminal Sig. **4** is taken out of the both ends of said luminous diode LD_2 for making the indication of the luminous diode LD_2 at outside. The anode of the PUJ_3 is connected to the gate of the fifth transistor Tr_5, and the collector of said fifth transistor Tr_5 is connected to the fixed contact b of the switch S_3, while its emitter is connected to the gate of the fifth thyristor SCR_5 through the capacitor C_{14}, the diode D_{11} in series, further the emitter is connected to the negative potential side of the power source E through the resistor R_{28}. And the connecting point of the capacitor C_{14} and the

diode D_{11} is connected to the negative potential side of the power source E through the resistor R_{29}. The gate of said fifth thyrister is connected to the negative potential side of the power source E through the resistor R_{30} to which the capacitor C_{15} is connected in parallel. And the anode of the fifth thyrister SCR_5 is connected to the fixed contact b of the switch S_3 through the resistor R_{31}, while the cathode of said fifth thyrister SCR_5 is connected to the negative potential side of the power source E through the resistor R_{32}. Also, the cathode of the fifth thyrister SCR_5 is connected to the gate of a fourth programable uni-junction (hereinafter called PUJ), and the anode of said PUJ_4 is connected to the fixed contact b of the switch S_6 through the fourth variable resistor RV_4, while the anode of the PUJ_4 is connected to the negative potential side of the power source E through the capacitor C_{16}, further the cathode of the PUJ_4 is connected to the connecting point between the above mentioned switch S_9 and the switch S_8. And a series circuit of the luminous diode LD_1 and the resistor R_{27} is connected in parallel with the both ends of the switch S_8, and a terminal Sig. **3** for making an indication of the luminous diode LD_1 at outside is taken out of the both ends of said luminous diode LD_1. The anode of said luminous diode LD_1 is connected to the fixed contact b of the switch S_6 through the connecting point between the above mentioned switch S_8' and the switch S_8. And a first shutter timer circuit is composed by the above mentioned resistor R_{24}, resistor R_{25}, the third variable resistor RV_3, the capacitor C_{13}, and PUJ_3, while a second shutter timer circuit is composed of the above mentioned resistor R_{31}, the resistor R_{32}, the fourth variable resistor RV_4, the capacitor C_{16}, and PUJ_4. Under such set-up as just mentioned, when the movable contact of the switch S_6 is changed over to the fixed contact c, and the movable contact of the switch S_3 is changed over to the fixed contact b side by locking of the lock mechanism **2**, the PUJ_3 becomes ON after a lapse of time of T seconds which is determined by the third variable resistor RV_3 and the capacitor C. If film exposure has been completed at this time the switches [S_9] S_8' and S_8 become ON, therefore the plus signal from the cathode of the PUJ_3 is given to the gate of the fourth thyrister SCR_4, placing said fourth thyrister SCR_4 in ON state, at this time a drive clock photographing by the first shutter timer circuit is done. On the other hand, if film exposure has not been completed the switch [S_9] S_8' is OFF, therefore the luminous diode LD_2 radiates light making such indication that the first shutter timer is not in proper state, and at the same time the fifth transistor Tr_5 becomes ON. By this plus pulse is generated by the resistor R and the capacitor C and is given to the gate of the fifth thyrister SCR_5, thus placing said thyrister in ON state. Because of this, the PUJ_4 becomes ON after an lapse of time of T seconds which is determined by the fourth variable resistor RV_4 and the capacitor C. If film exposure has been completed by this time the switch S_8 becomes ON, therefore the fourth thryister SCR_4 becomes ON by the plus pulse from the cathode of the PUJ_4. At this time a drive clock photographing by the second shutter timer control circuit will be made. Also if the film exposure hs not been completed the switch S, becomes OFF, therefore the luminous diode LD_1 radiates light making such indication that the second shutter timer also is improper. When the film exposure is completed the switch S_8 becomes ON, and the plus pulse from the cathode of the PUJ_4 is given to the gate of the fourth thyrister, placing

said thyrister in ON state. At this time photographing is done with shutter clock and the above mentioned indication that the second shutter timer is also improper means that photographing will be done with shutter clock. By connecting these shutter timer circuits any number of shutter timers may be set.

As has been described in detail according to the present invention the rotation of a motor is transmitted by an electro-magnetic clutch. And thus the shutter release wind up can be repeated while the rotation of the motor is continued, easily allowing high speed continuous photographing. Also since outside trigger terminals are provided at the photographing time control circuit and at the photographing interval time control circuit, the photographing cycle can be easily controlled by such external signal as light, sound, electric wave, etc. Also as the time set at the photographing time control circuit can be made variable, a wide range of shutter speed can be used depending on exposure conditions, further by changing over the switch S_5 four different modes of use that is hand holding and remote for each of one frame photographing and continuous photographing can be easily selected. Furthermore, a plural number of timer circuits are provided at the photographing time control circuit, and when film exposure time comes in accord with each of the time set at each timer circuit, it is made as the photographing time, and even when the film exposure time exceeds each of the set time, automatically the completion of film exposure is waited and is made as the photographing time, thus both drive clock system and shutter clock system can be provided. The electric control device for a camera in the present invention has such effect that the state of photographing action can be easily seen by eyes as a means provided to indicate whether the drive clock or the shutter clock is in use.

What is claimed is:

1. An electric control device for a camera which comprises a first electro-magnetic clutch means for shutter release being able to be coupled to a motor being rotated, a second electro-magnetic clutch means for shutter wind-up also being able to be coupled to a motor being rotated, a first clutch control means placing said first electro-magnetic clutch means in a coupled state in association with pressing down of a release button, a lock means operable to lock a release member when said first electro-magnetic clutch means is in coupled state to initiate shutter release, a first switch means responsive to the operation of the lock means to place said first electro-magnetic clutch means in a noncoupled state, a photographing time control circuit rendered effective by the operation of said lock means, a lock release means operative to release the above mentioned lock means after a lapse of time set by said photographing time control circuit, a second electro-magnetic clutch control means responsive to the operation of the lock release means to place the above mentioned second electro-magnetic clutch means in a coupled state, and a second switch means operative upon the completion of the above mentioned shutter wind-up to place the above mentioned second electro-magnetic clutch means in a non-coupled state, whereby separate shutter release and wind-up operations may be accomplished while the motor is being continuously rotated.

2. An electric control device for a camera according to claim **1**, in which the device further comprises, a triggerable photographing interval time control circuit operable upon triggering for establishing a predetermined time delay, means responsive to the operation of the second switch means for triggering the photographing interval time control circuit, and means rendered effective at the conclusion of the time delay established by the photographing interval time control circuit for again placing the fist electro-magnetic clutch means in the coupled state.

3. An electric control device for a camera according to claim **1**, in which the device further comprises means responsive to the operation of the second switch means for terminating the rotation of the motor.

4. An electric control device for a camera according to claim **1**, in which the photographing time control circuit comprises an adjustable R-C series circuit operable when selected for manually setting the above mentioned time lapse manually, an external input operable when selected for setting the above mentioned time lapse in accordance with an external parameter, and third switch means for selecting between the series circuit and the external input.

5. An electric control device for a camera according to claim **2**, in which the photographing interval time control circuit comprises an adjustable R-C series circuit operable when selected for setting the above mentioned time delay manually, an external input operable when selected for setting the above mentioned time delay in accordance with an external parameter, and third switching means for selecting between the series circuit and the external input.

6. An electric control device for a camera according to claim **2** wherein the photographing time control circuit and the photographing interval time control circuit comprise timer circuits made as separate units from a main body of the camera.

7. An electrical control device for a camera according to claim **1**, in which the photographing time control circuit comprises a plural number of timer circuits to set times, and in which the photographing time control circuit includes facilities for setting the photographing time equal to the time required for exposure of film when such exposure time exceeds any one of said set times.

8. An electric control device for a camera according to claim **7** in which the photographing time control circuit further comprises a means to indicate that the photographing time is over the set time.

9. An electric control device for a camera according to claim **7** in which the photographing time control circuit further comprises a means to indicate that the photographing time is within the set time.

10. In a camera having a shutter capable of being wound and a shutter release member, comprising a rotatable motor, a first electro-magnetic clutch means coupled to the shutter for releasing the shutter and coupleable to the motor, a second electro-magnetic clutch means coupled to the shutter for winding the shutter and coupleable to the motor being rotated, a first clutch control means coupled to the first electro-magnetic clutch means and the release member for engaging said first clutch means in response to operation of the release member, a lock means coupled to the release member and said first electro-magnetic clutch means for locking the release member in a release position when the first electro-magnetic clutch means is engaged, a first switch means responsive to the operation of the lock means for disengaging said first clutch means, a photographic time control circuit coupled to said lock means and rendered effective by operation of said lock means, said time control circuit including a timer, first signal means in

said time control circuit coupled to the timer for producing an output signal in response to the timer, second signal means in the time control circuit for producing an output signal in response to external stimuli, a lock release means operative to release said lock means in response to the output signal of said first signal means and said second signal means, a switching means in the time control circuit coupled to said first signal means and said second signal means and said lock release means for selectively applying one of the signals from said first signal means and the signals from said second signal means to said lock release means, a second electro-magnetic clutch control means responsive to the operation of said lock release means for engaging said second clutch means to wind the shutter, a second switch means coupled to the shutter and coupled to said second clutch means for disengaging said second clutch means in response to the shutter being wound.

11. An electric control device for a camera according to claim 10, in which the device further comprises a triggerable interval time control circuit operable upon triggering for establishing a predetermined time delay, means responsive to the operation of the second switch means for triggering the interval time control circuit, and means rendered effective at the conclusion of the time delay established by the interval time control circuit for again placing the first electro-magnetic clutch means in the coupled state.

12. An electric control device for a camera according to claim 10, in which the device further comprises means responsive to the operation of the second switch means for terminating the rotation of the motor.

13. An electric control device for a camera according to claim 10, in which the photographing time control circuit comprises an adjustable R-C series circuit operable when selected for manually setting a time lapse, an external input operable when selected for setting the time lapse in accordance with an external parameter, and third switch means for selecting between the R-C series circuit and the external input.

14. An electric control device for a camera according to claim 11, in which the photographing interval time control circuit comprises an adjustable R-C series circuit operable when selected for setting the above mentioned time delay manually, an external input operable when selected for setting the above mentioned time delay in accordance with an external parameter, and third switching means for selecting between the series circuit and the external input.

15. An electric control device for a camera according to claim 15, wherein the photographing time control circuit and the photographing interval time control circuit comprise timer circuits made as separate units from a main body of the camera.

16. An electrical control device for a camera according to claim 10, in which the photographing time control circuit comprises a plural number of time circuits to set times, and in which the photographing time control circuit includes facilities for setting the photographing time equal to the time required for exposure of film when such exposure time exceeds any one of said set times.

17. An electric control device for a camera according to claim 16, in which the photographing time control circuit further comprises a means to indicate that the photographing time is over the set time.

18. An electric control device for a camera according to claim 16, in which the photographing time control circuit further comprises a means to indicate that the photographing time is within the set time.

19. An electric driving device for a camera in which a shutter release means and a winding means are driven by a driving means to sequentially release and wind a shutter, comprising:

a first timer coupled to and actuated in response to the release means for producing a signal upon elapse of a predetermined time after actuation of the timer;

a first receiving means for receiving an external exposure completion signal;

a first gate coupled to said first receiving means and said first timer for applying the signal of either one of said first timer and said first receiving means to the winding means;

a second timer coupled to the winding means and actuated by completion of winding of said winding means to produce an output upon elapse of a prescribed time after actuation of said second timer;

a second receiving means to receive an external signal and producing an output; and

a second gate coupled to said second timer and said second receiving means for applying the output of one of said second timer and said second receiving means to said release means.

20. A device according to claim 19, in which the first gate is a switch.

21. An electric driving device for a camera in which a shutter release means and a winding means are driven by a driving means to subsequentially release and wind a shutter comprising;

a first timer coupled to and actuated in response to the release means for producing a signal upon elapse of a predetermined time after actuation of the timer;

a switching means for connecting the first timer and the winding means in response to completion of an exposure;

a second timer coupled to the winding means and actuated by completion of winding of said winding means to produce an output upon elapse of a prescribed time after actuation of said second timer;

a receiver means to receive an external signal and producing an output; and

a gate coupled to said second timer and said receiving means for applying the output of one of said second timer and said receiving means to said release means.

22. A device according to claim 21, which further comprises;

second receiving means for receiving outside signals, and selector means for adding the output of any of said first timer and the second receiving means.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. Reissue 29505 Dated December 27, 1977

Inventor(s) Hiroshi Aizawa et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the Reissue Patent [30] should read as follows:

[30]--Foreign Application Priority Data

December 30, 1971 Japan.....47-1089--.

Signed and Sealed this

Twenty-third Day of *May 1978*

[SEAL]

Attest:

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Acting Commissioner of Patents and Trademarks