US00RE36945E

United States Patent [19]

Kobayashi et al.

[11] E **Patent Number: Re. 36,945**

[45] **Reissued Date of Patent: Nov. 7, 2000**

[54] **SHUTTER DEVICE IN AUTOMATIC FOCUSING AND EXPOSURE CAMERA**

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[73] Assignee: **Asahi Kogaku Kogyo Kabushiki Kaisha**, Tokyo, Japan

[21] Appl. No.: **08/421,514**

[22] Filed: **Apr. 13, 1995**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **5,202,721**
Issued: **Apr. 13, 1993**
Appl. No.: **07/574,780**
Filed: **Aug. 30, 1990**

[30] **Foreign Application Priority Data**

Sep. 1, 1989	[JP]	Japan	1-102932
Sep. 1, 1989	[JP]	Japan	1-226524
Sep. 19, 1989	[JP]	Japan	1-243104

[51] **Int. Cl.**^{7} **G03B 7/08**

[52] **U.S. Cl.** **354/441**; 354/430

[58] **Field of Search** 354/435, 439, 354/441, 228, 231, 233, 414, 420, 422, 423

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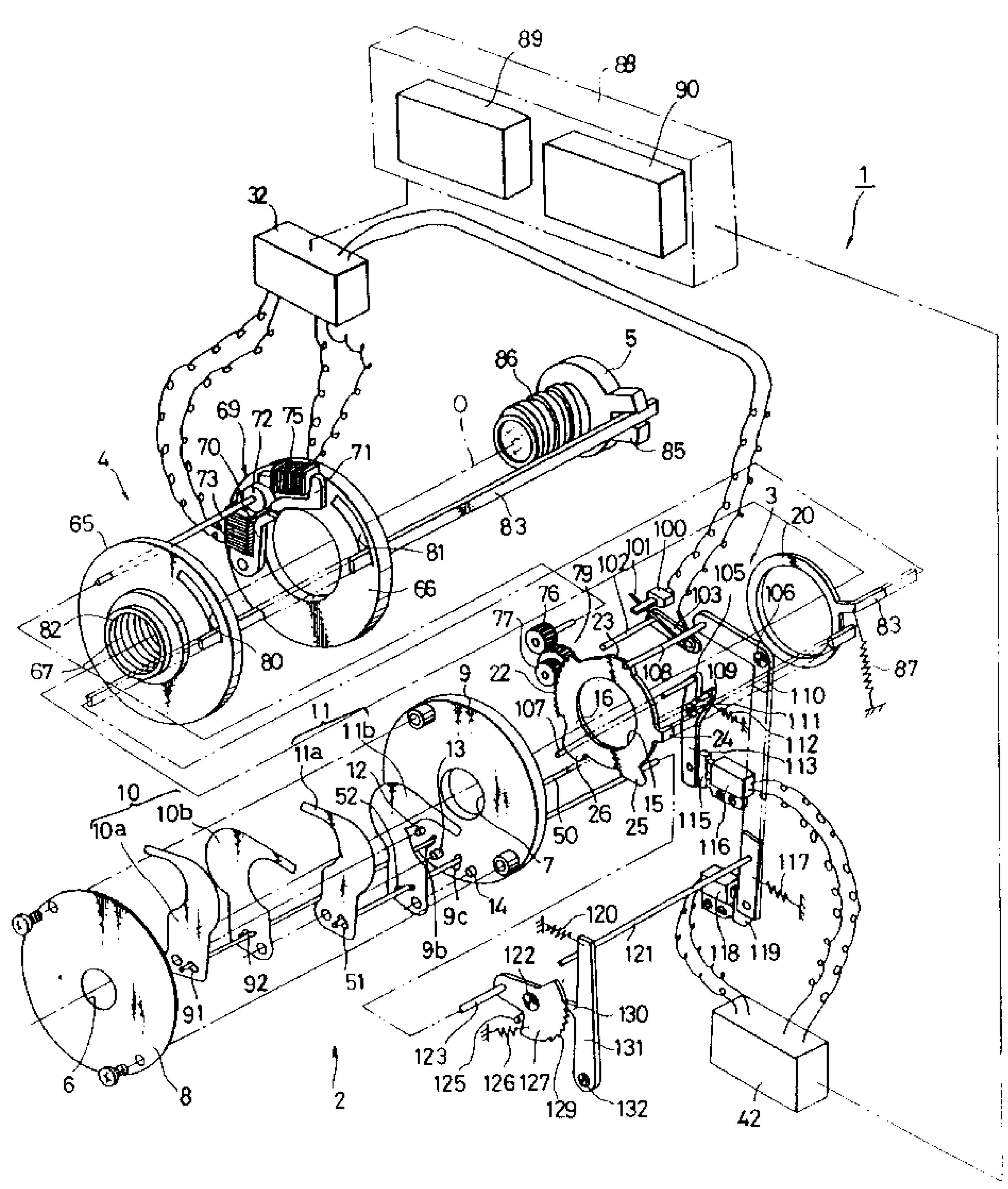
2080558	2/1982	United Kingdom .
2158601	11/1985	United Kingdom .
8100464	2/1981	WIPO .

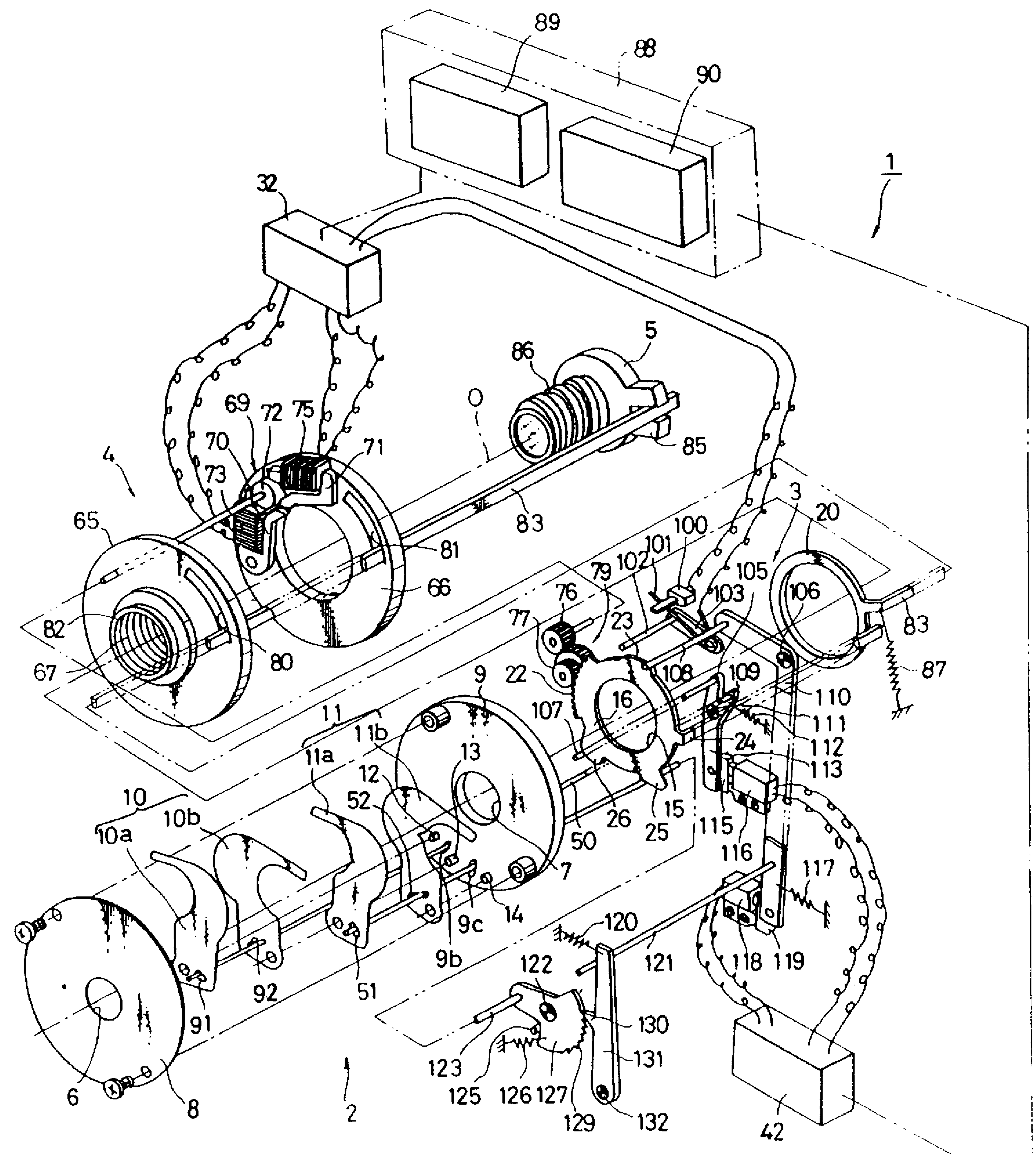
Primary Examiner—Russell E. Adams
Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

[57] **ABSTRACT**

A shutter device of a camera which includes first and second sector mechanisms which constitute a lens shutter and which are independently opened and closed to define an aperture. A photometer, for detecting the luminance of an object to be photographed, and a diaphragm controller for controlling the aperture defined by the second sector mechanism, in accordance with luminance data detected by the photometer, are provided. A shutter opening element is provided which normally closes the first sector mechanism and opens the first sector mechanism when the second sector mechanism is held to define a predetermined aperture determined by the diaphragm controller, and a shutter closing element is provided which closes the second sector mechanisms at a predetermined timing in accordance with the luminance data of the photometer after the first sector mechanism is opened by the shutter opening element.

48 Claims, 29 Drawing Sheets





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11b
11a
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10b
10a
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9c
9b
120
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132
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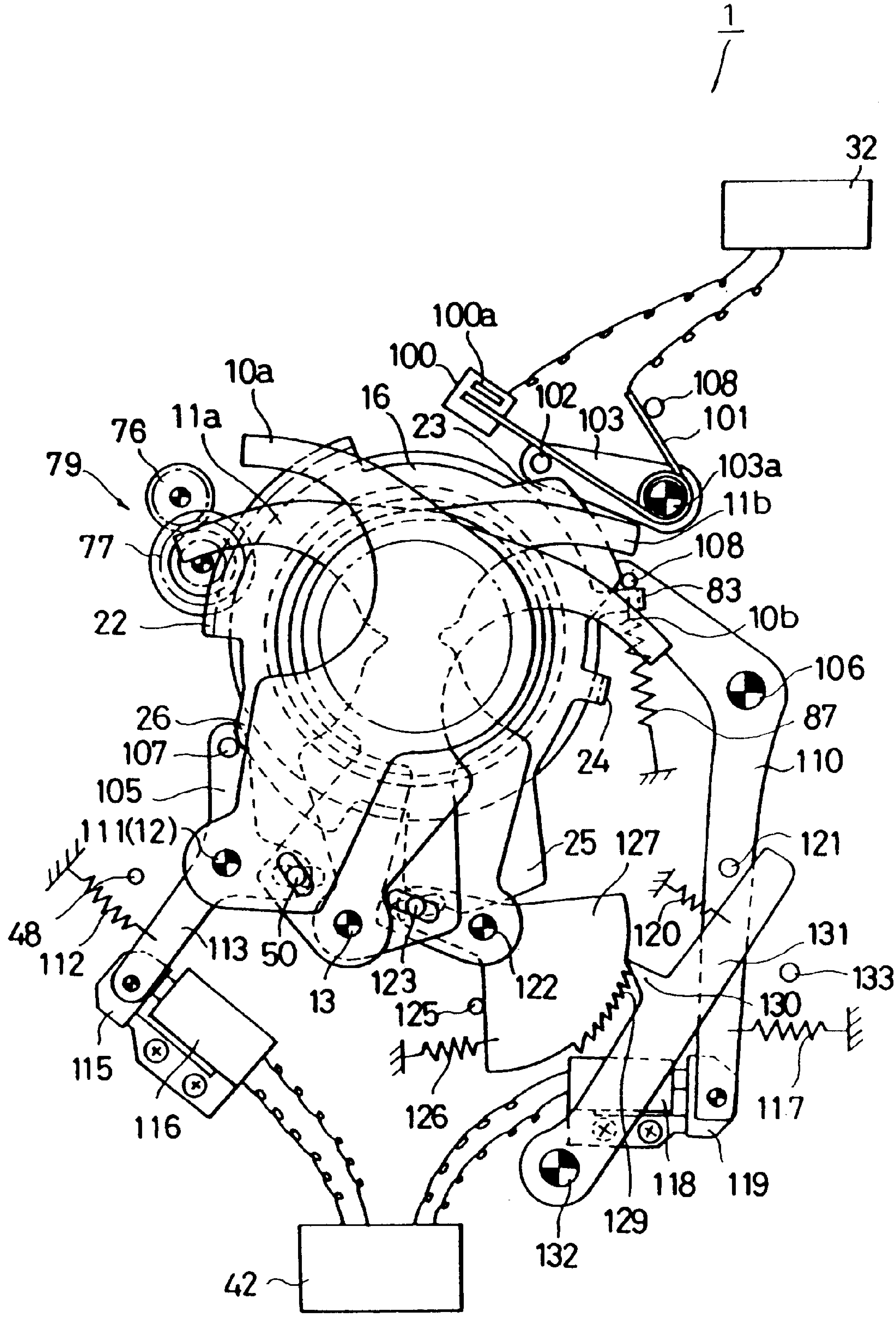
Fig. 1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11a
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10b
106
87
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111(12)
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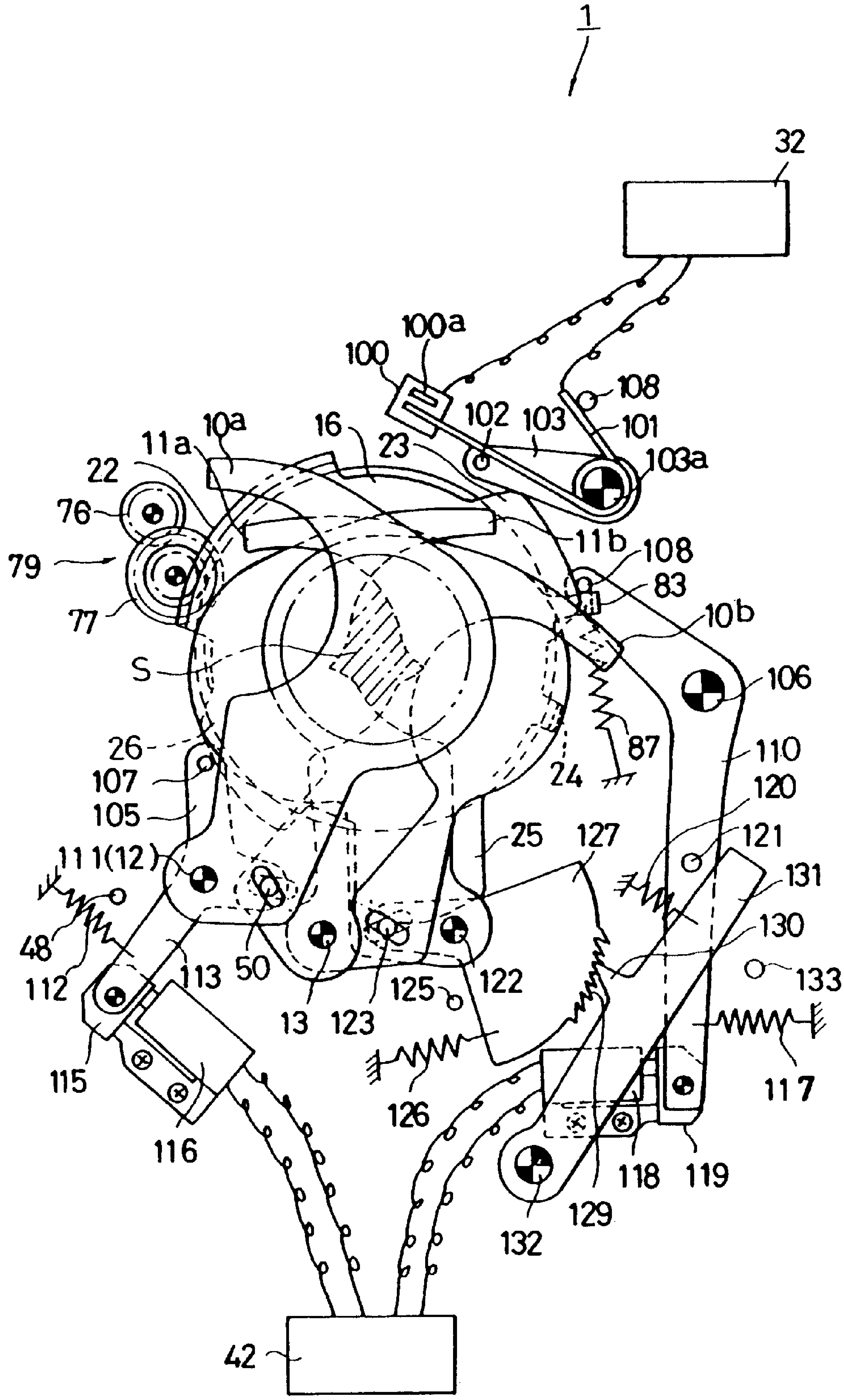
Fig. 2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127
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111(12)
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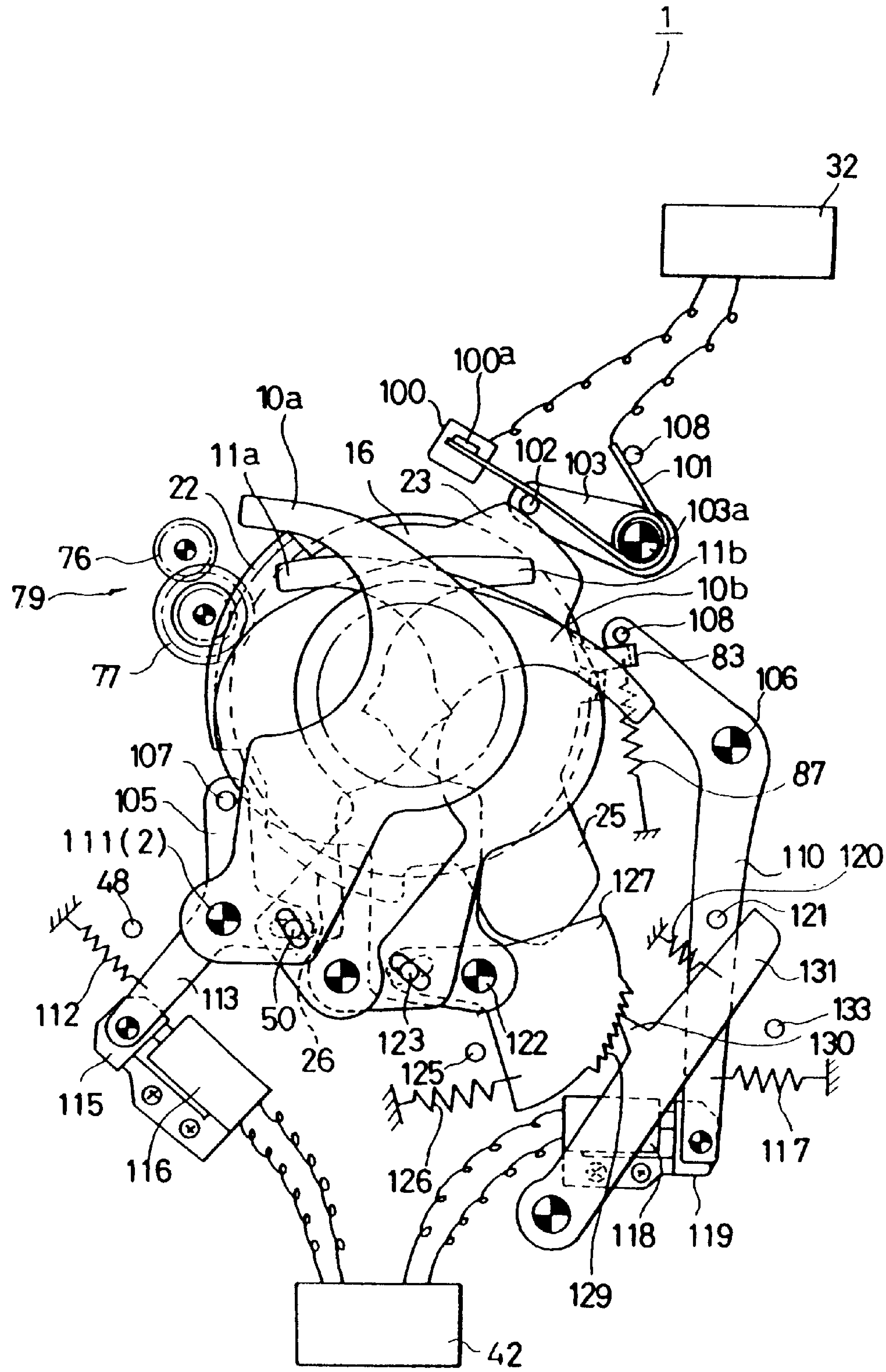
FIG. 3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111(2)
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42

Fig. 4

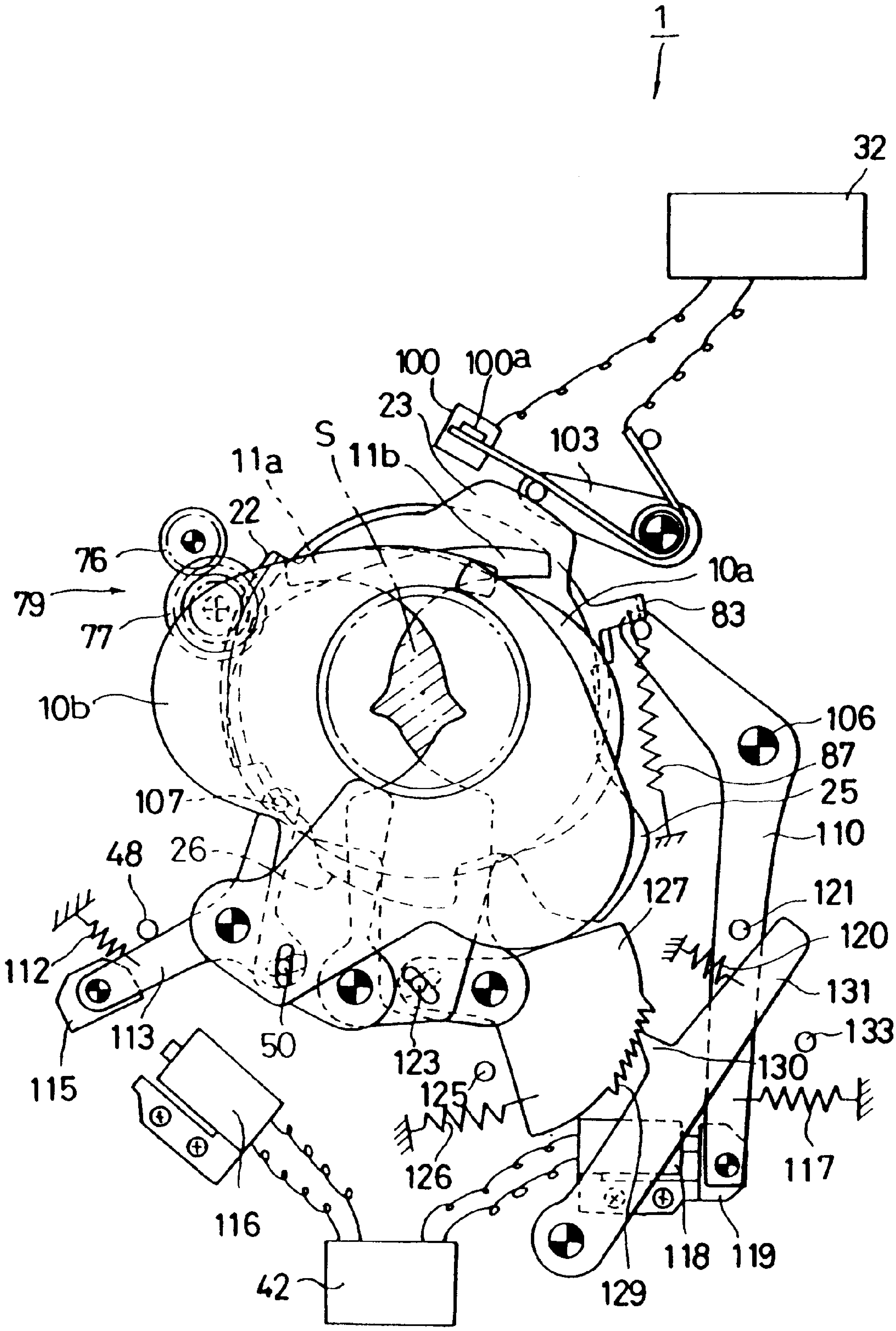
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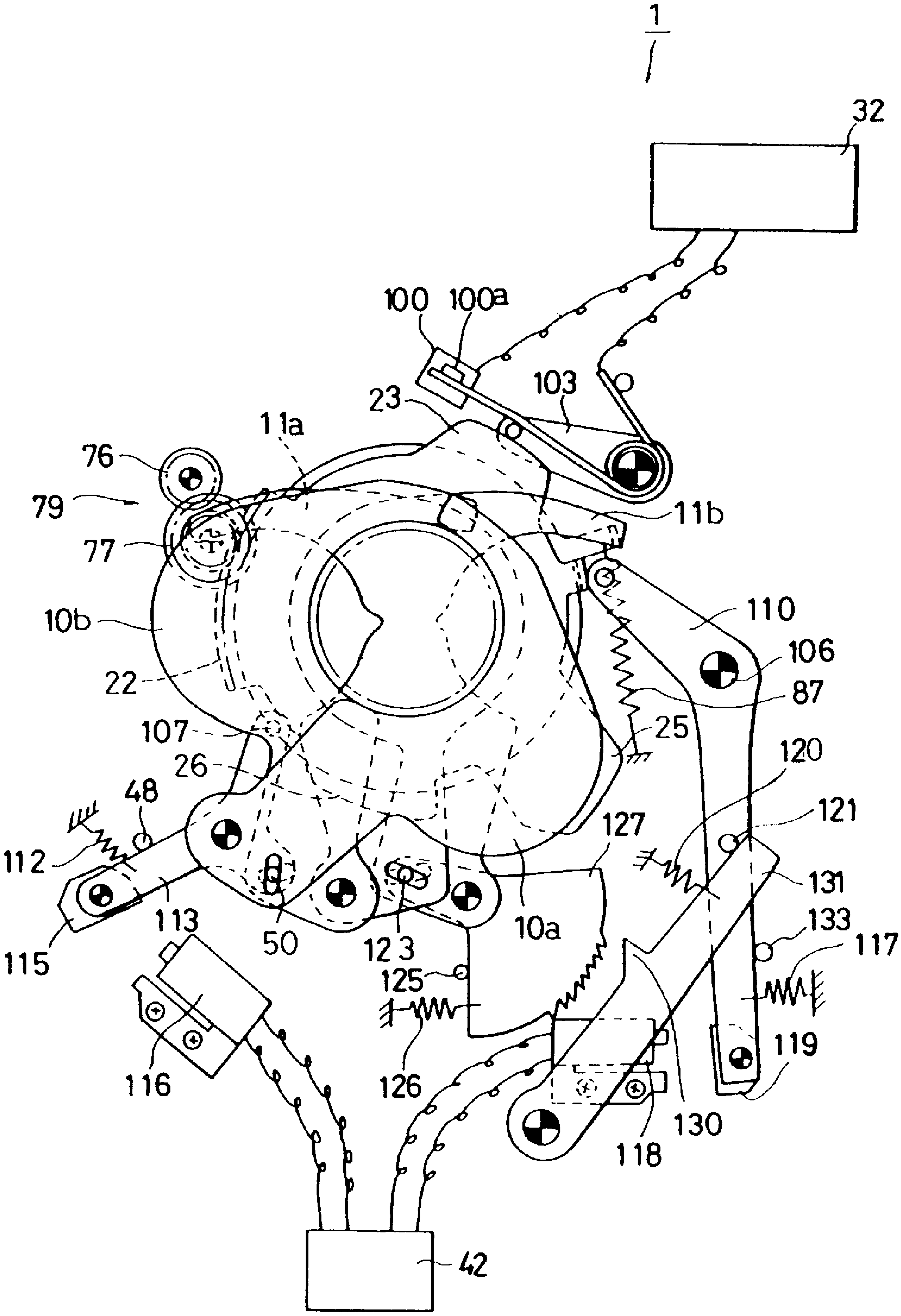
Fig. 5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11b
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10b
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10a
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119
126
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118
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Fig. 6

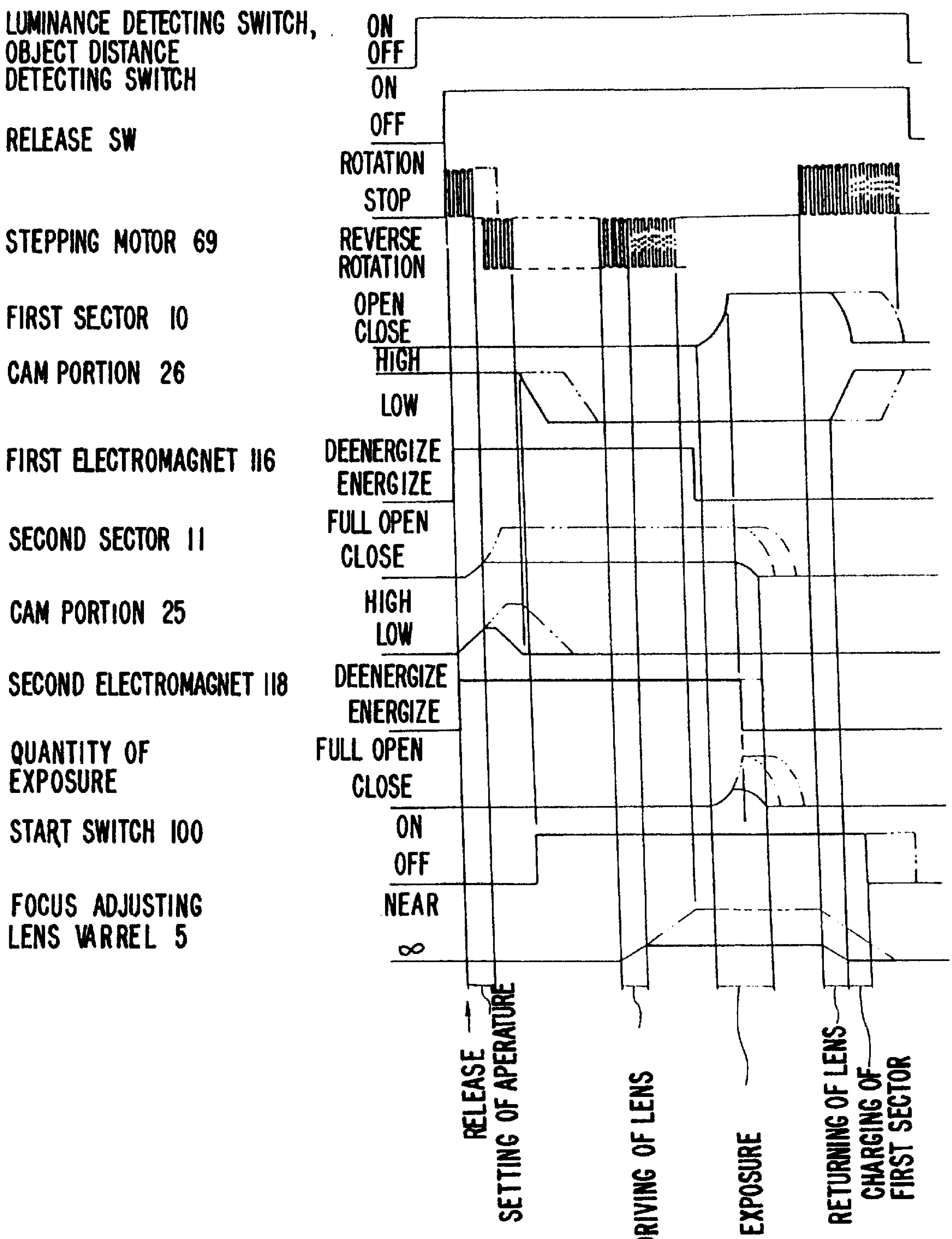
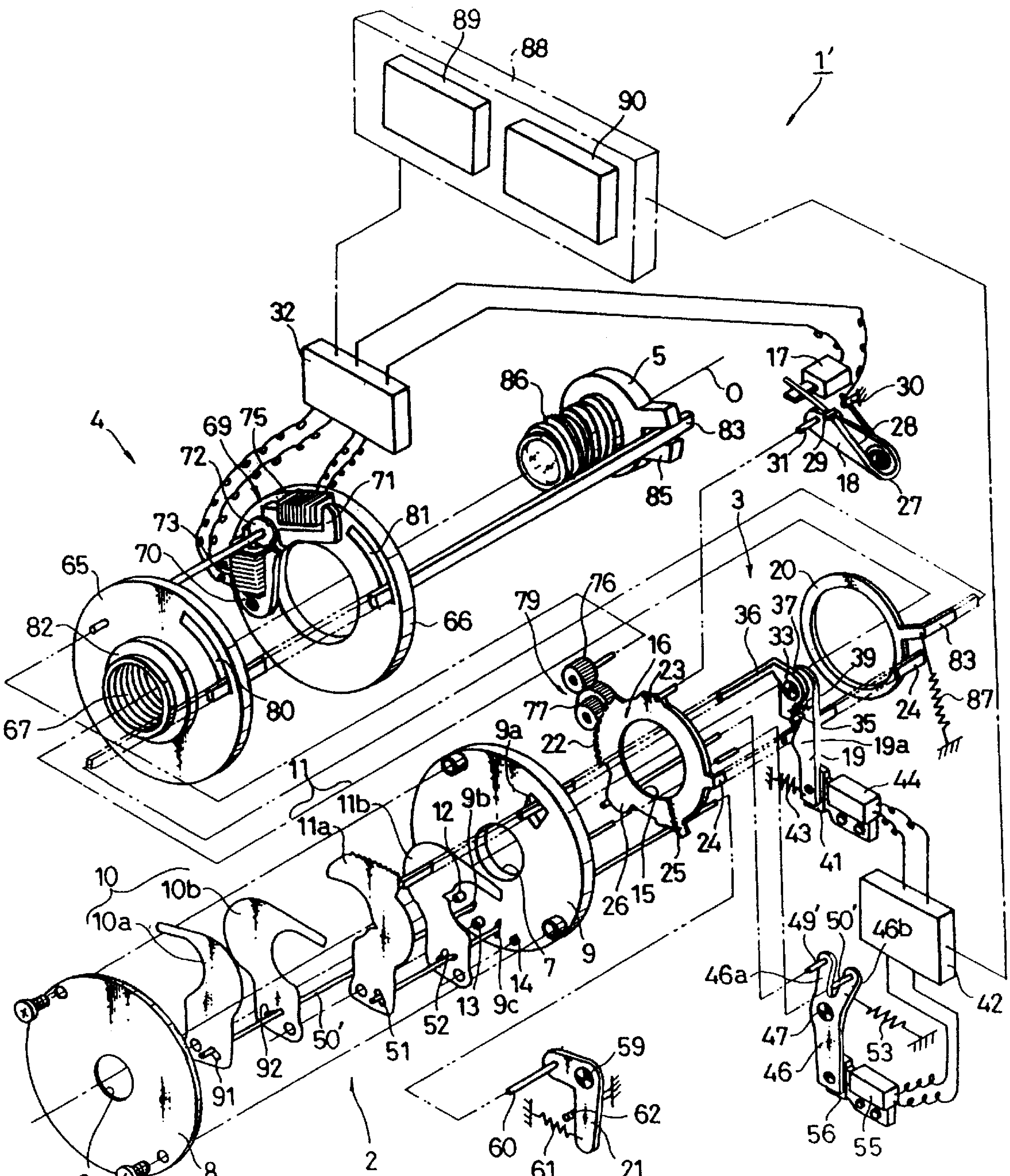

LUMINANCE DETECTING SWITCH, OBJECT DISTANCE DETECTING SWITCH
ON
OFF
RELEASE SW
ON
OFF
STEPPING MOTOR 69
ROTATION
STOP
REVERSE ROTATION
FIRST SECTOR 10
OPEN
CLOSE
CAM PORTION 26
HIGH
LOW
FIRST ELECTROMAGNET 116
DEENERGIZE
ENERGIZE
SECOND SECTOR 11
FULL OPEN
CLOSE
CAM PORTION 25
HIGH
LOW
SECOND ELECTROMAGNET 118
DEENERGIZE
ENERGIZE
QUANTITY OF EXPOSURE
FULL OPEN
CLOSE
START SWITCH 100
ON
OFF
FOCUS ADJUSTING LENS VARREL 5
NEAR
∞
RELEASE
SETTING OF APERATURE
DRIVING OF LENS
EXPOSURE
RETURNING OF LENS
CHARGING OF FIRST SECTOR

Fig. 7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19a
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9a
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11b
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41
11a
26
15
25
24
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10b
10a
7
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49'
50'
46b
46a
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9c
14
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50'
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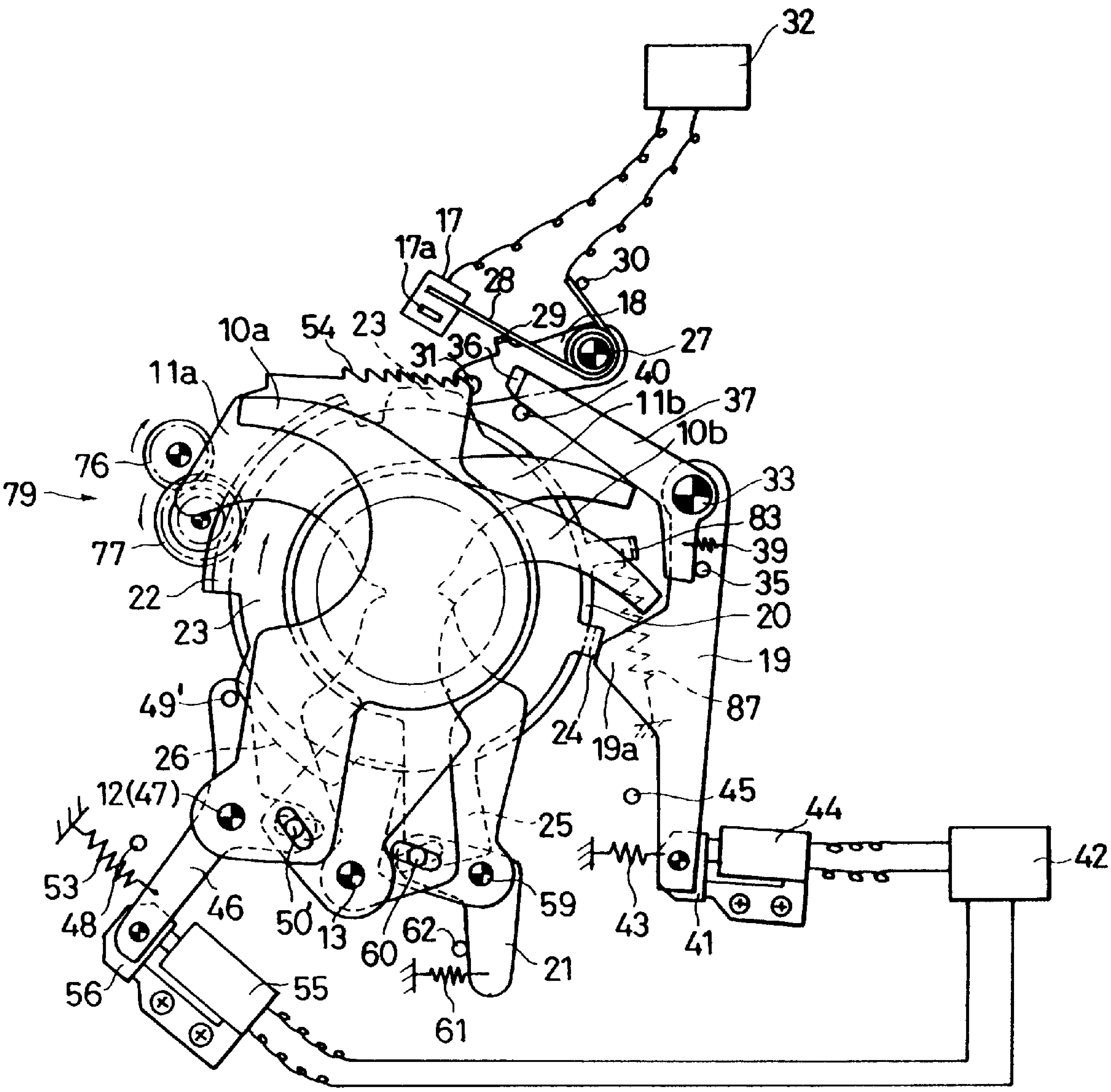
Fig. 8



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11b
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10b
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83
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22
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23
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49'
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19a
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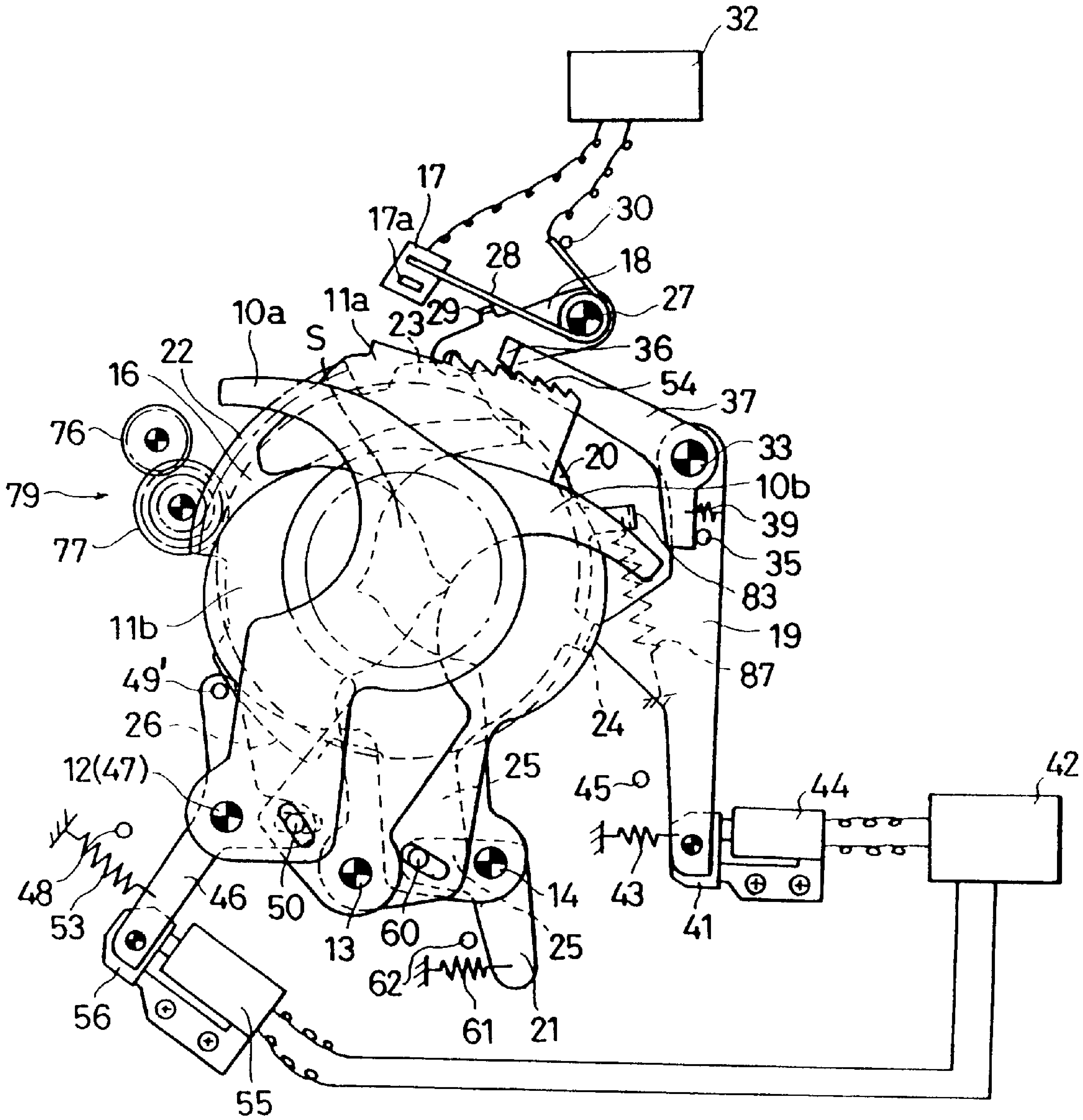
Fig. 9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10b
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77
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35
83
11b
19
87
49'
26
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12(47)
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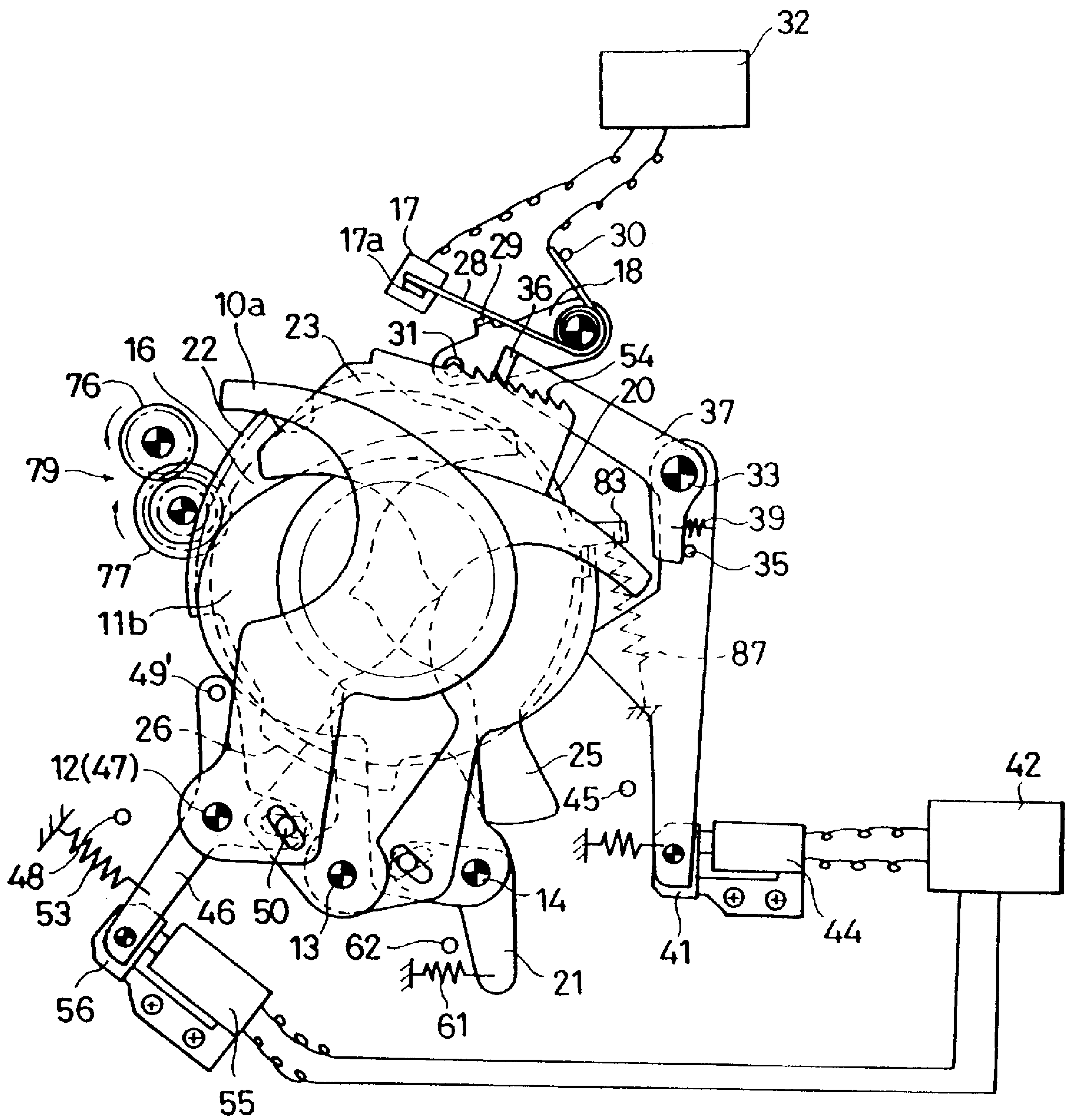
Fig.10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35
77
11b
87
49'
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62
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56
61
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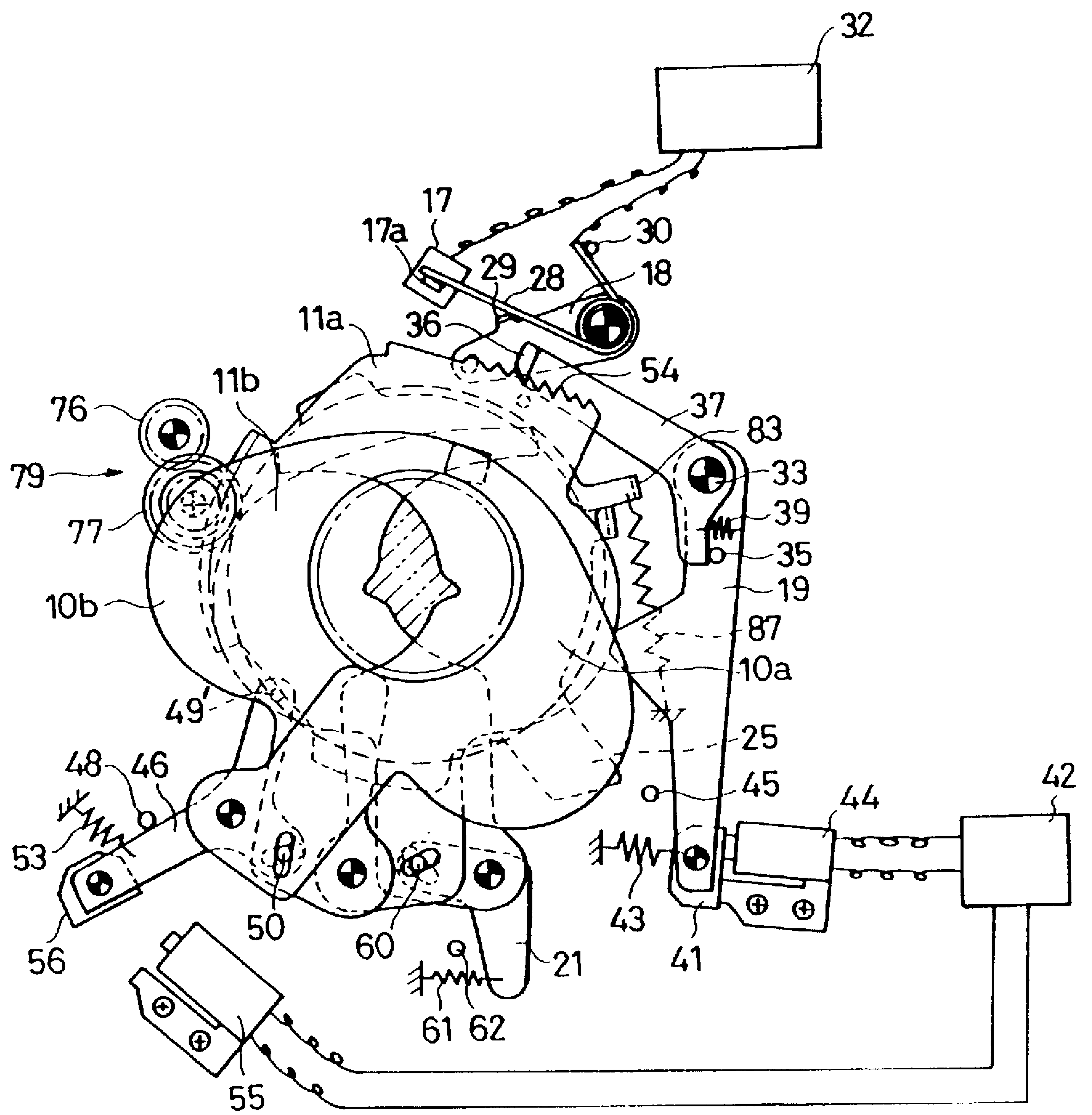
FIG. 11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11a
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11b
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10b
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87
10a
49'
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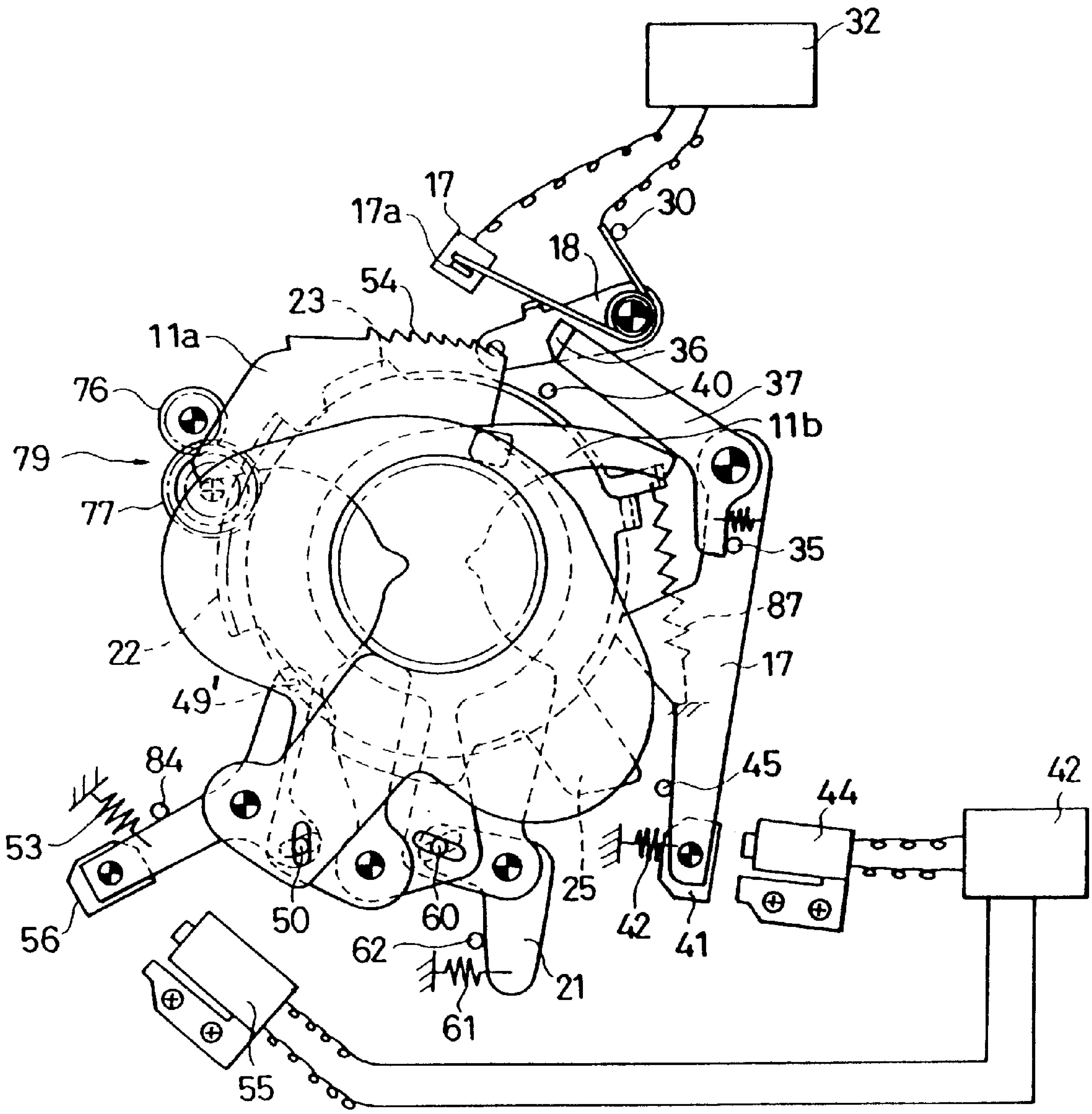
Fig. 12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17a
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11a
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37
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11b
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87
22
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49'
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84
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56
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61
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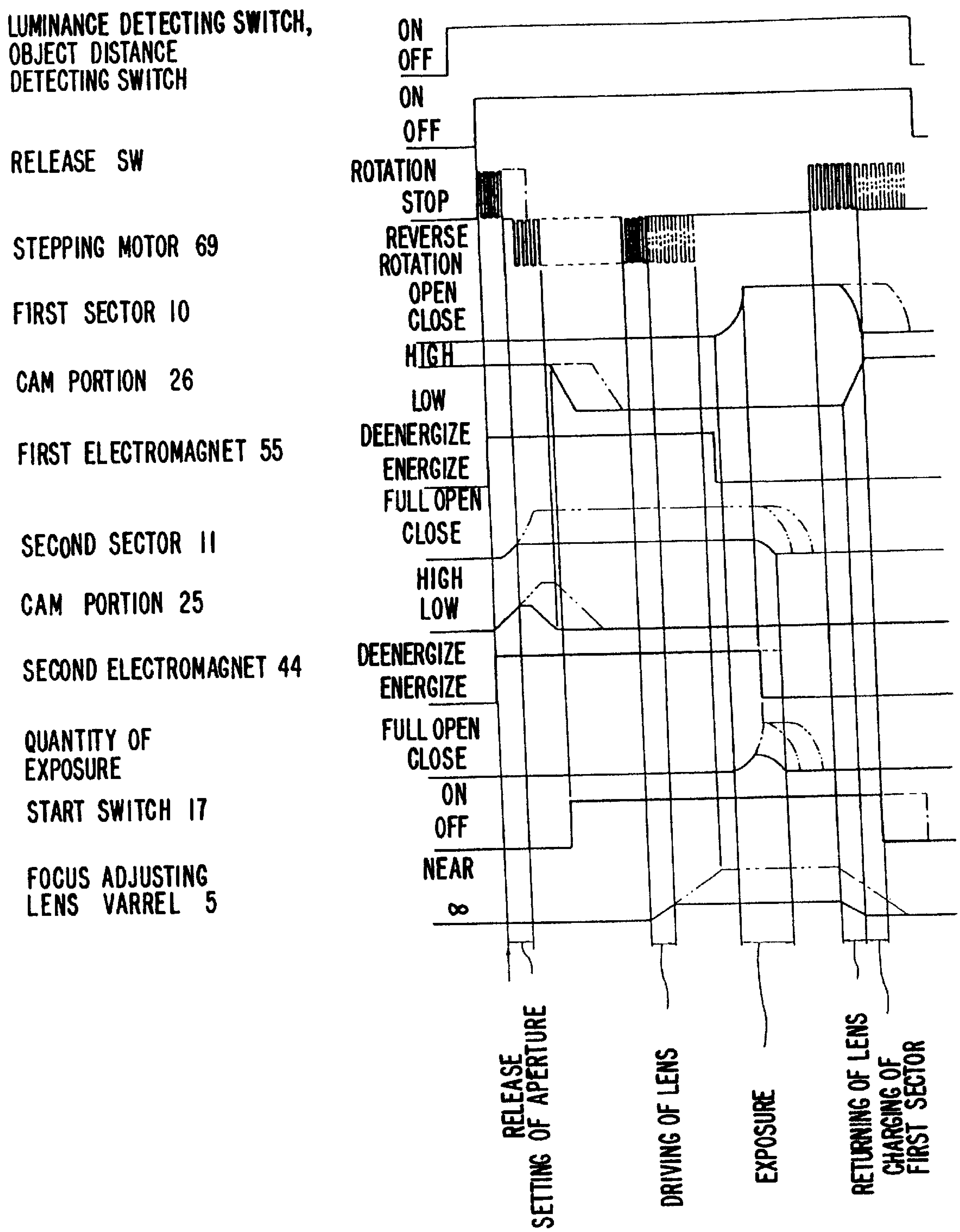
Fig. 13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OBJECT DISTANCE
DETECTING SWITCH
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RELEASE SW
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OFF
STEPPING MOTOR 69
ROTATION
STOP
REVERSE
ROTATION
FIRST SECTOR 10
OPEN
CLOSE
CAM PORTION 26
HIGH
LOW
FIRST ELECTROMAGNET 55
DEENERGIZE
ENERGIZE
SECOND SECTOR 11
FULL OPEN
CLOSE
CAM PORTION 25
HIGH
LOW
SECOND ELECTROMAGNET 44
DEENERGIZE
ENERGIZE
QUANTITY OF
EXPOSURE
FULL OPEN
CLOSE
START SWITCH 17
ON
OFF
FOCUS ADJUSTING
LENS VARREL 5
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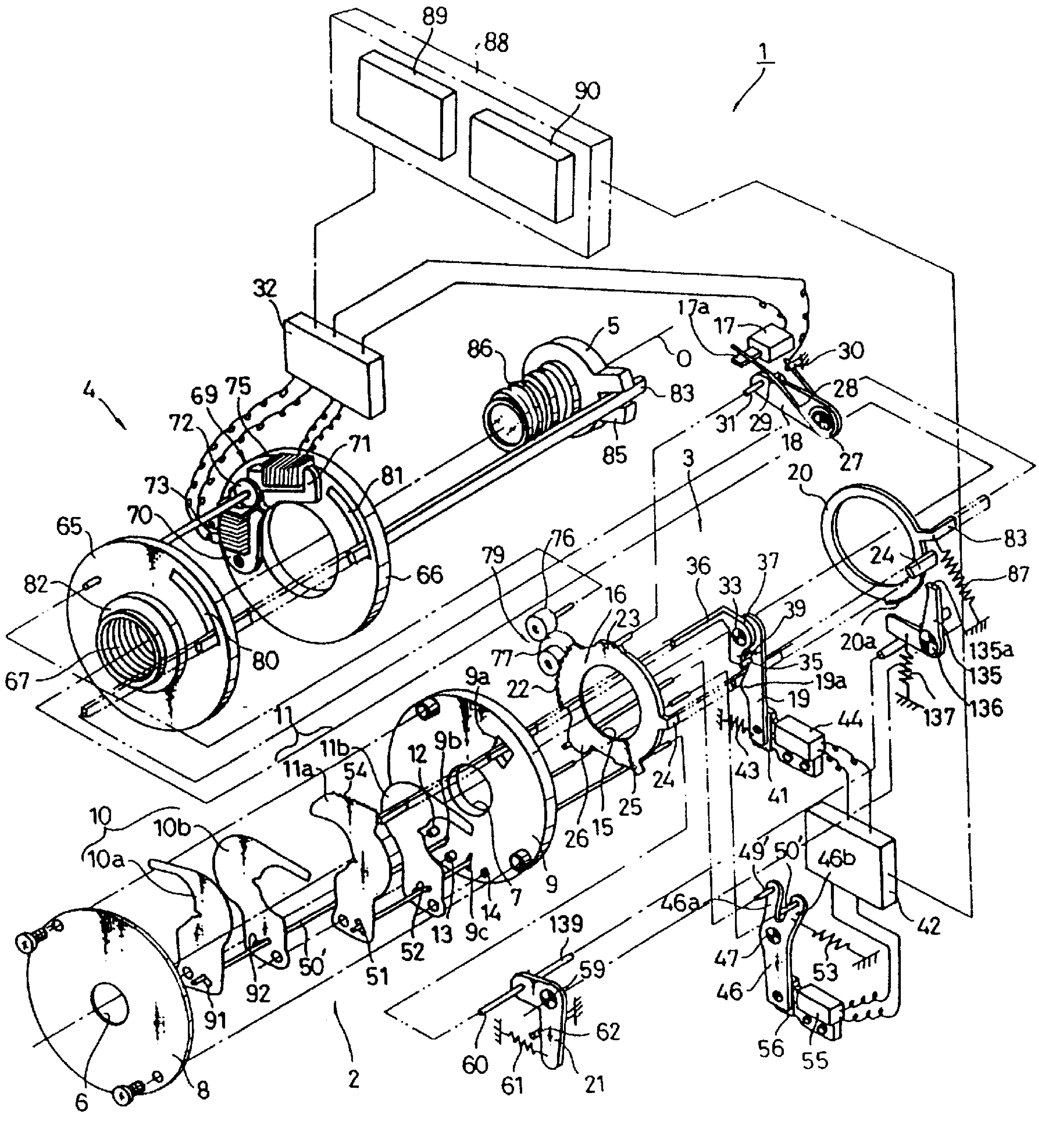
∞
RELEASE
SETTING OF APERTURE
DRIVING OF LENS
EXPOSURE
RETURNING OF LENS
CHARGING OF
FIRST SECTOR

Fig. 14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46a
46b
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49'
50'
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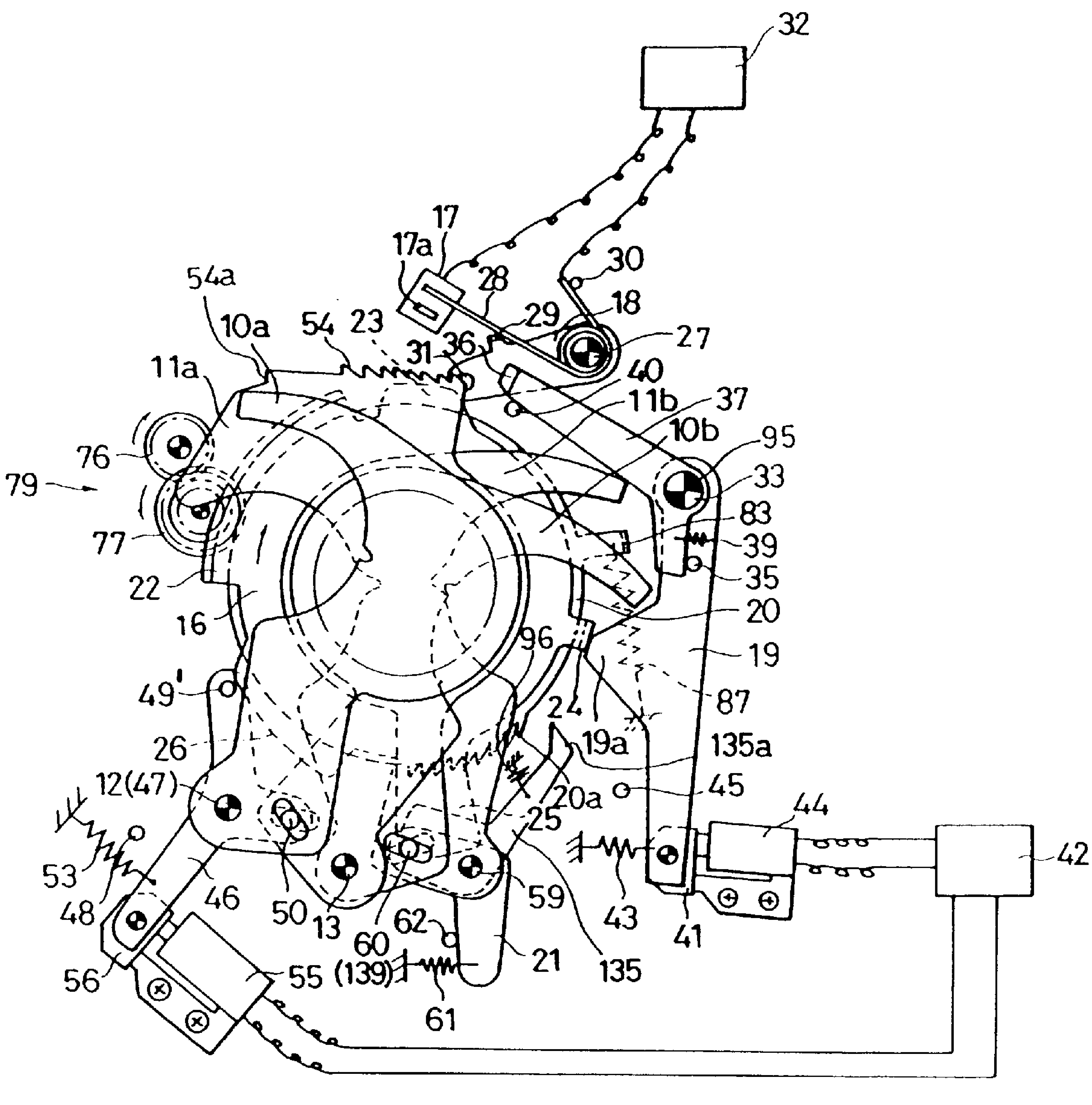
Fig. 15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10b
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76
33
79
83
77
39
35
22
20
16
19
96
49'
87
24
26
19a
135a
12(47)
20a
45
44
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46
13
59
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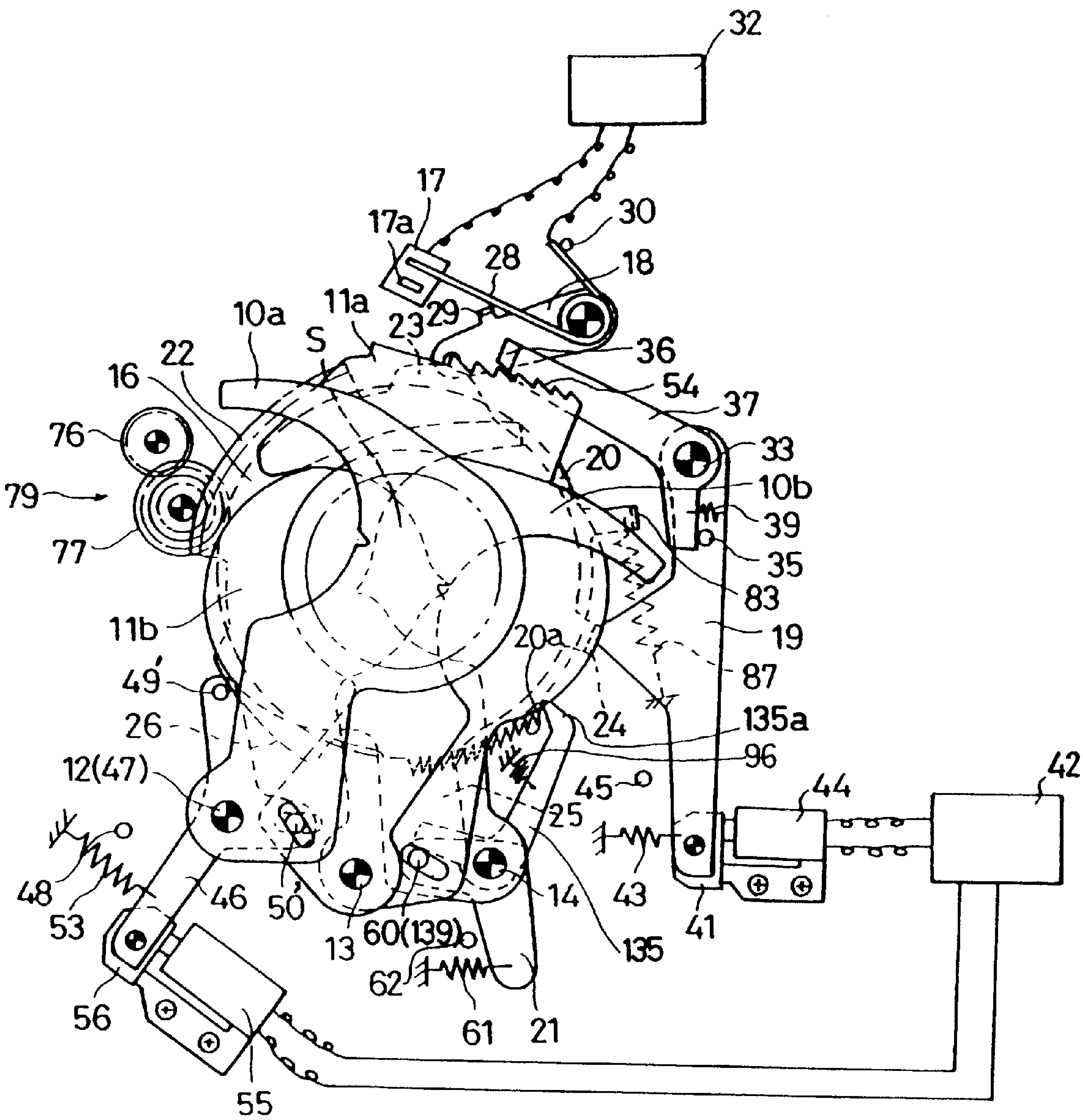
62
56
55
(139)
21
135
61

FIG. 16



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83
11b
19
20a
87
49'
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135a
26
96
12(47)
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60(139)
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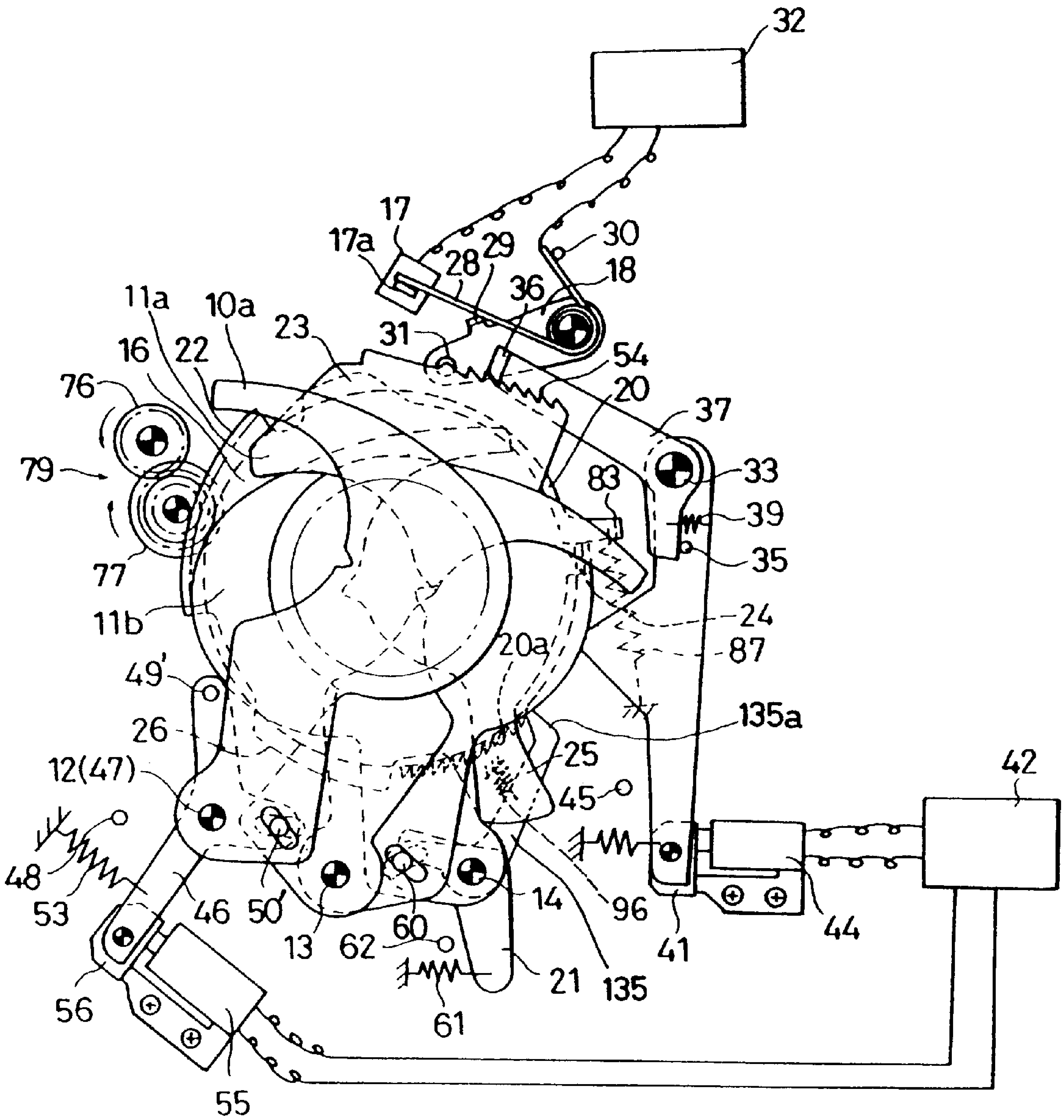
Fig.17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83
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77
35
11b
24
20a
87
49'
135a
26
25
42
12(47)
45
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50'
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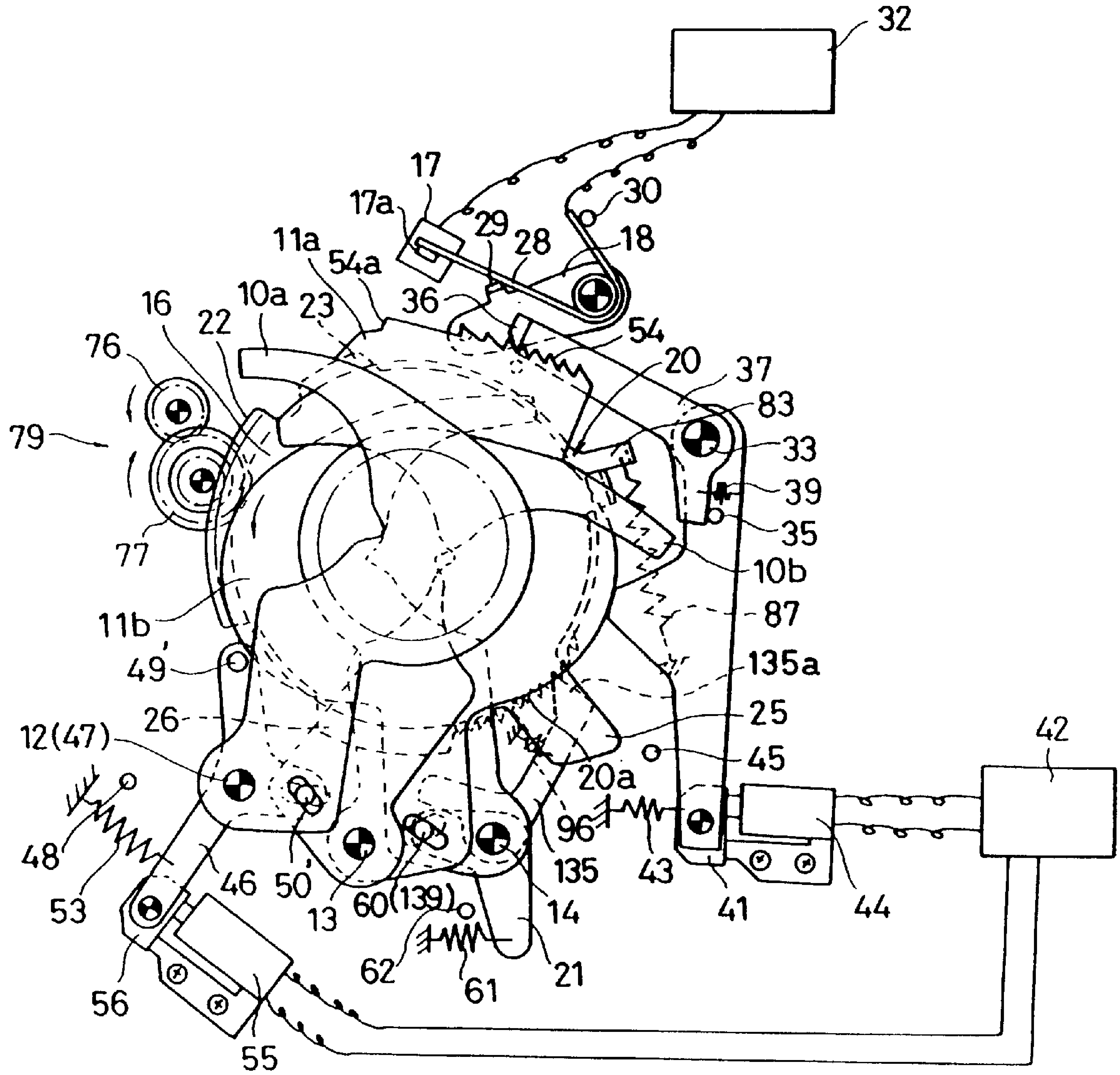
Fig.18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10b
11b
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135a
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25
12(47)
45
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60(139)
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Fig. 19

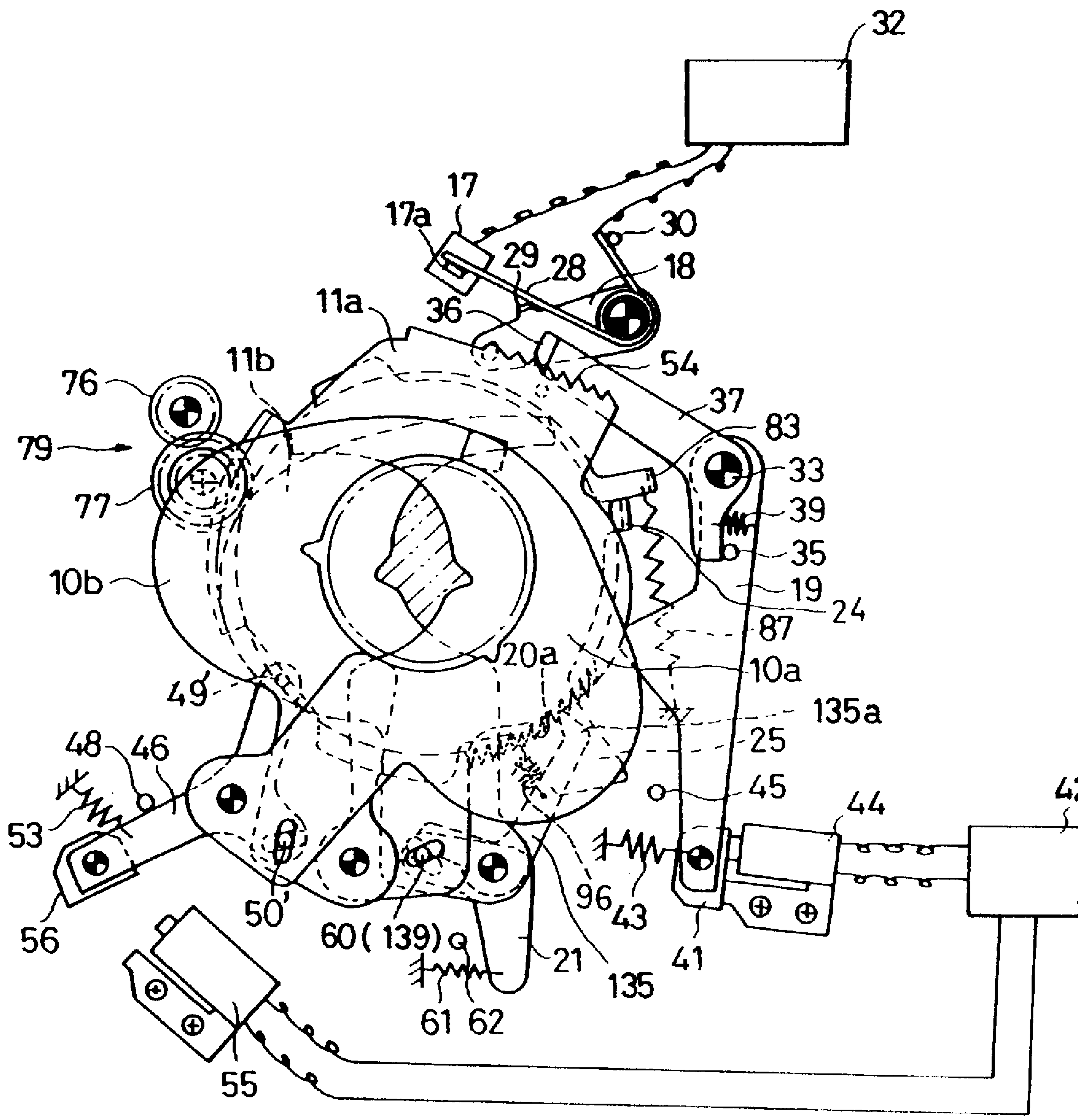

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FIG. 20

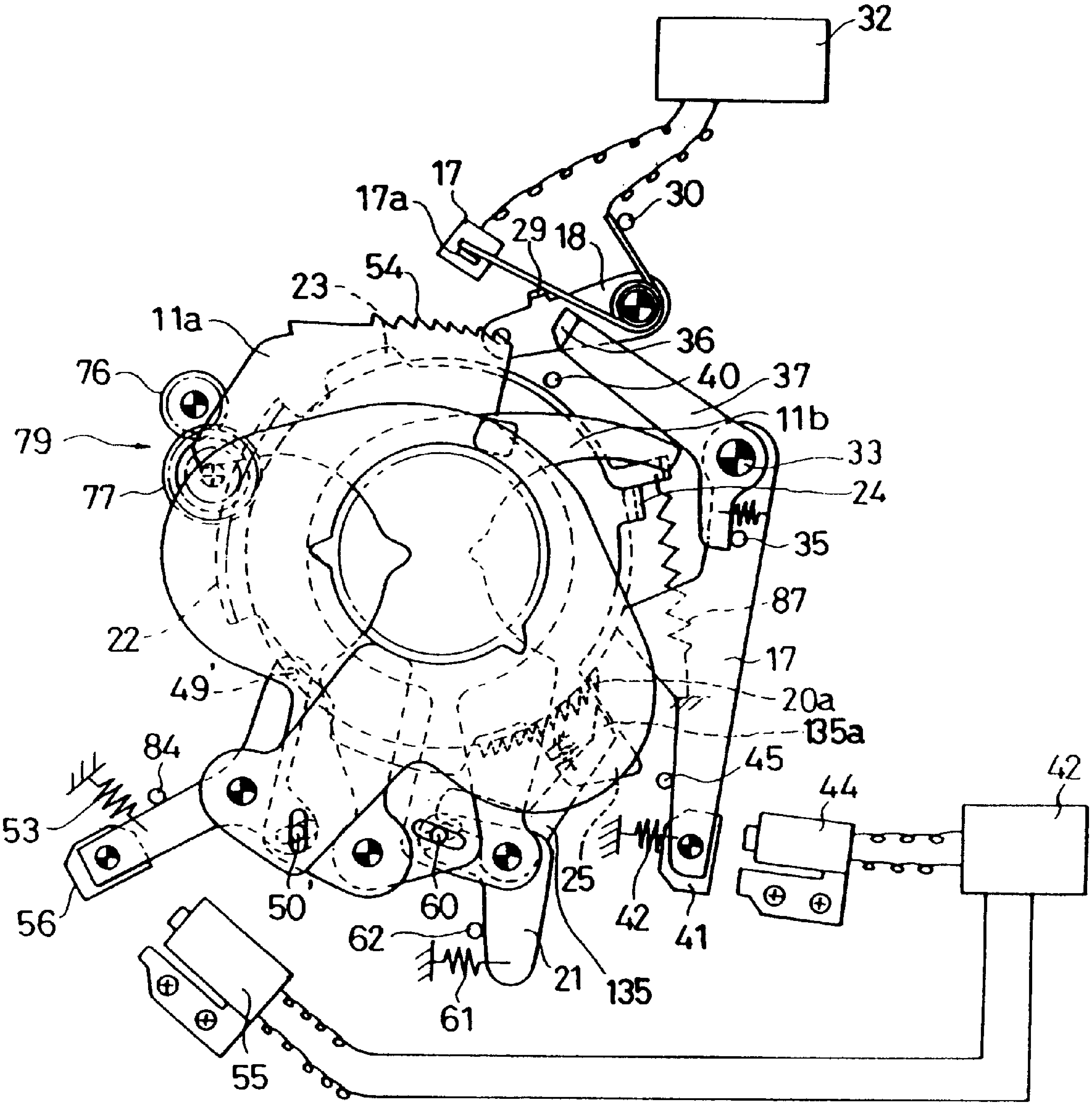
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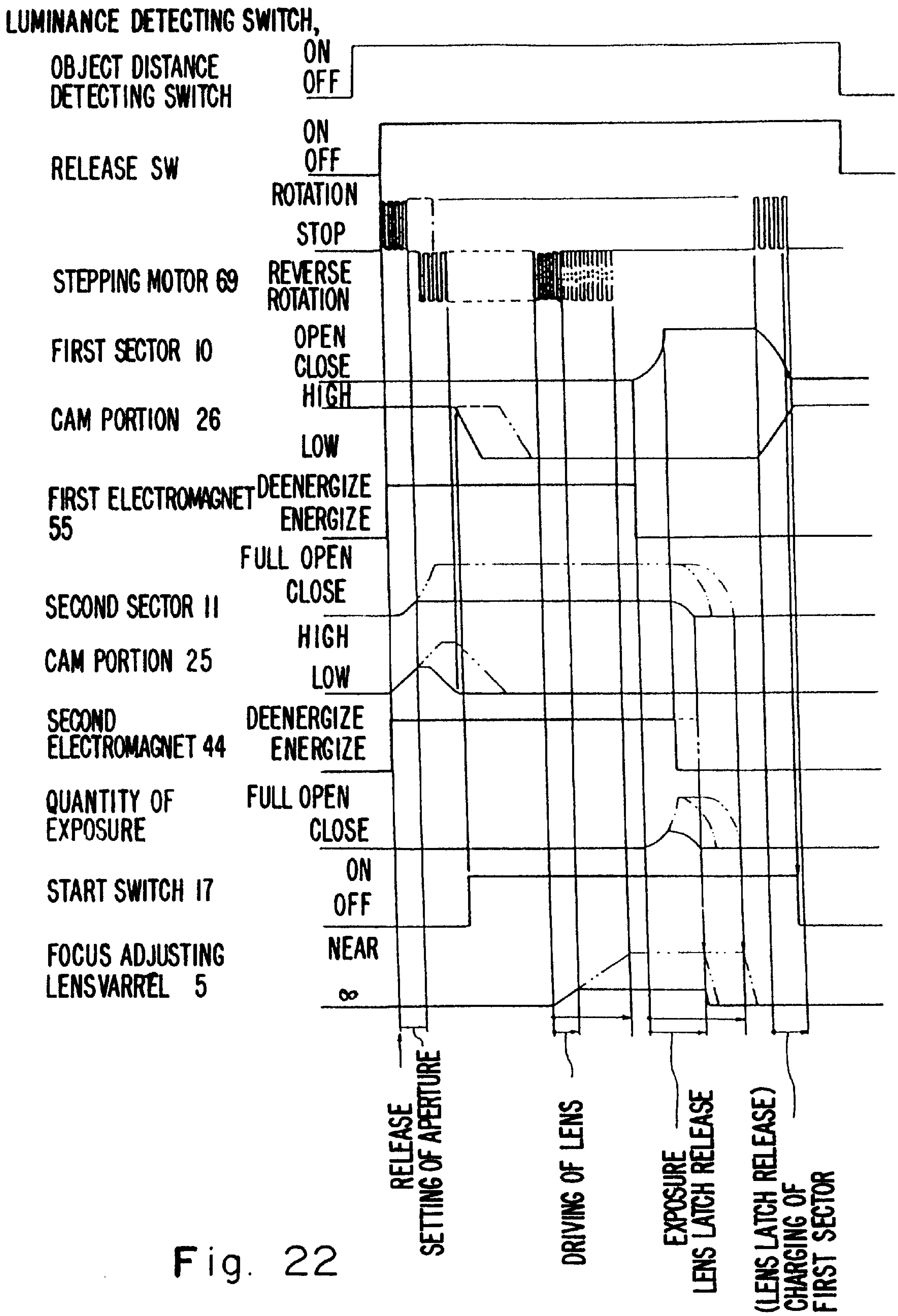
Fig. 21


LUMINANCE DETECTING SWITCH,
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RELEASE SW
ON
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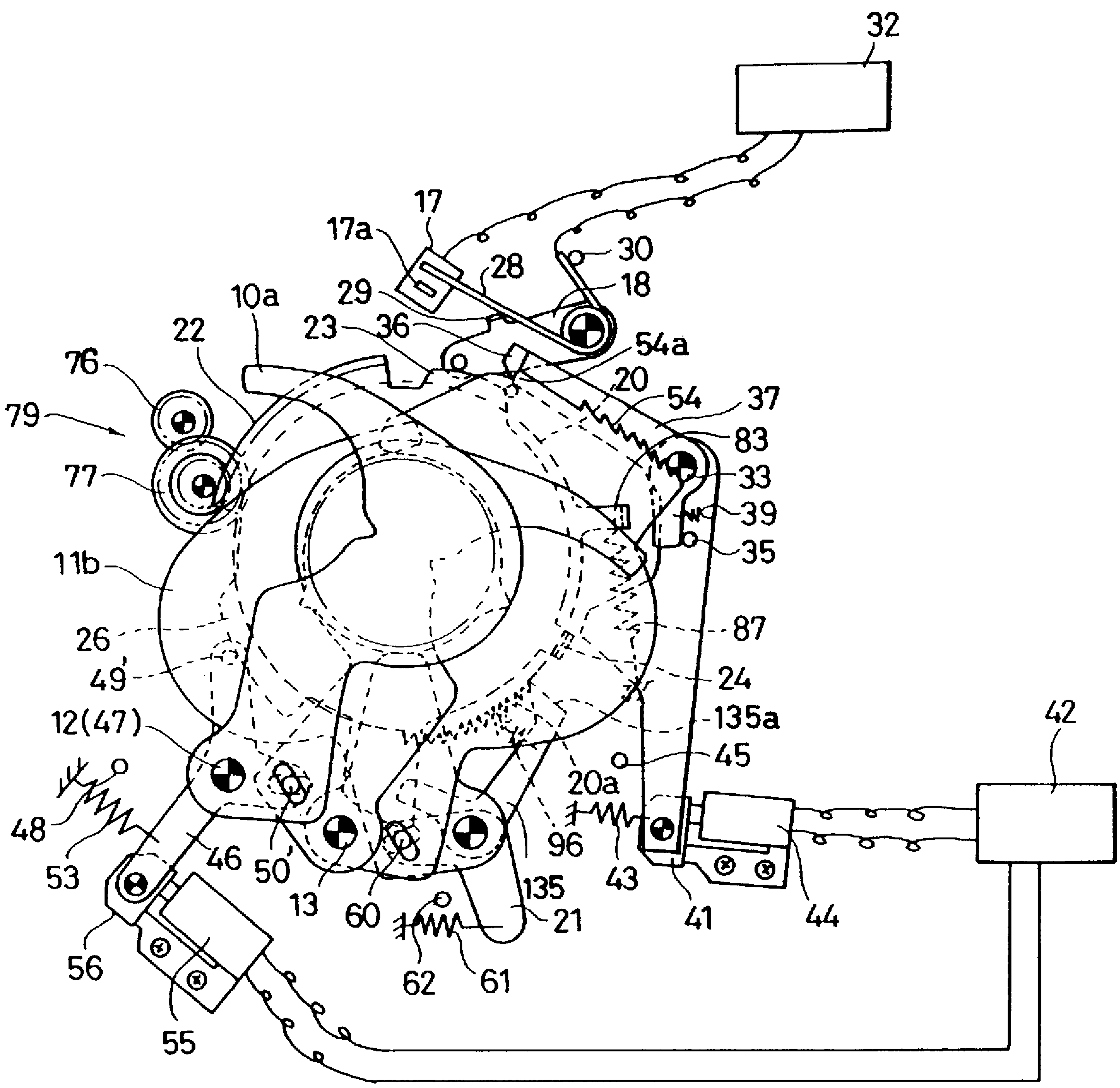
ROTATION
STOP
STEPPING MOTOR 69
REVERSE ROTATION
FIRST SECTOR 10
OPEN
CLOSE
CAM PORTION 26
HIGH
LOW
FIRST ELECTROMAGNET 55
DEENERGIZE
ENERGIZE
FULL OPEN
CLOSE
SECOND SECTOR 11
CAM PORTION 25
HIGH
LOW
SECOND ELECTROMAGNET 44
DEENERGIZE
ENERGIZE
QUANTITY OF EXPOSURE
FULL OPEN
CLOSE
START SWITCH 17
ON
OFF
FOCUS ADJUSTING LENSVARREL 5
NEAR
∞
RELEASE
SETTING OF APERTURE
DRIVING OF LENS
EXPOSURE
LENS LATCH RELEASE
(LENS LATCH RELEASE)
CHARGING OF FIRST SECTOR

Fig. 22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11b
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12(47)
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Fig. 23

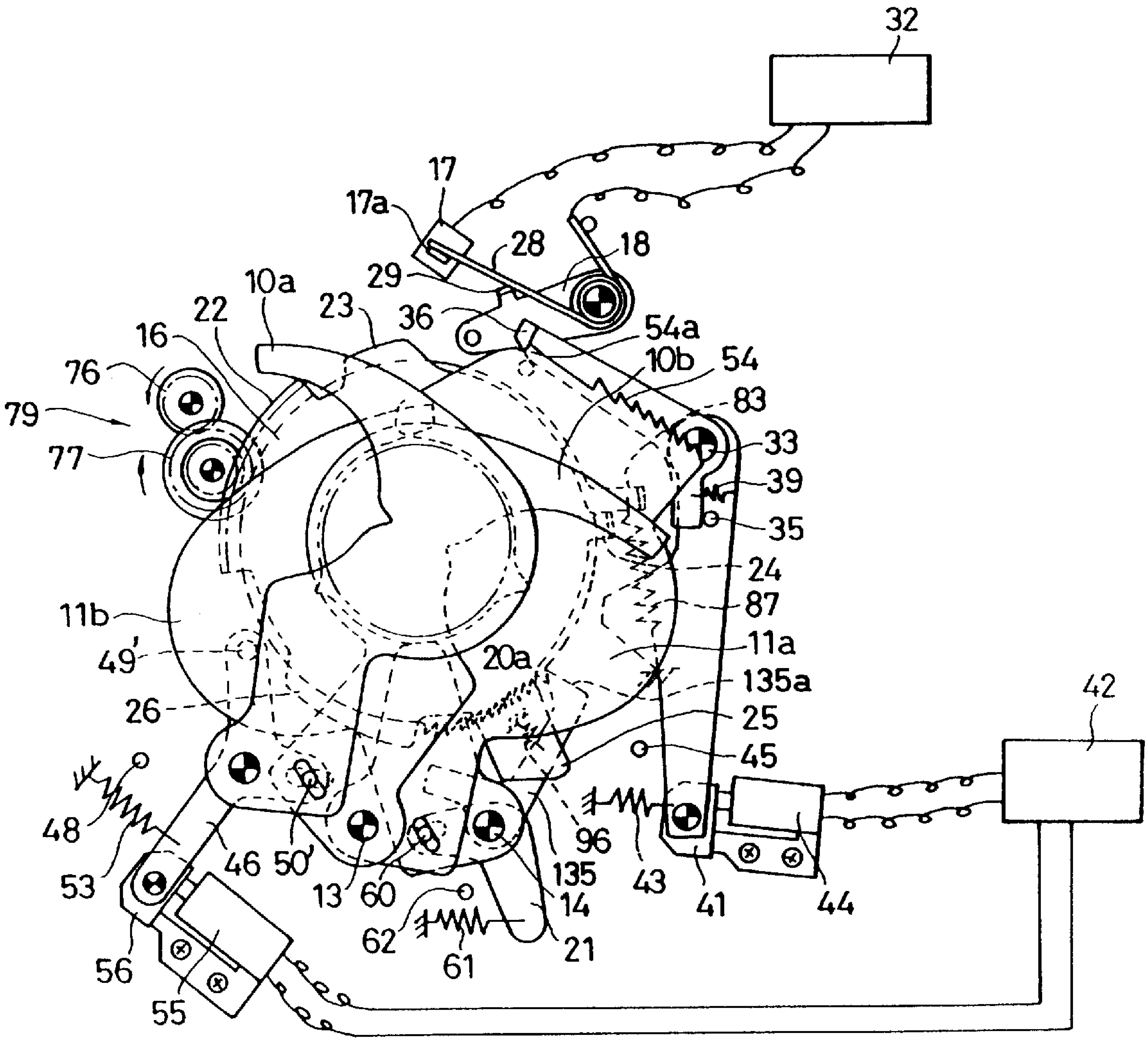
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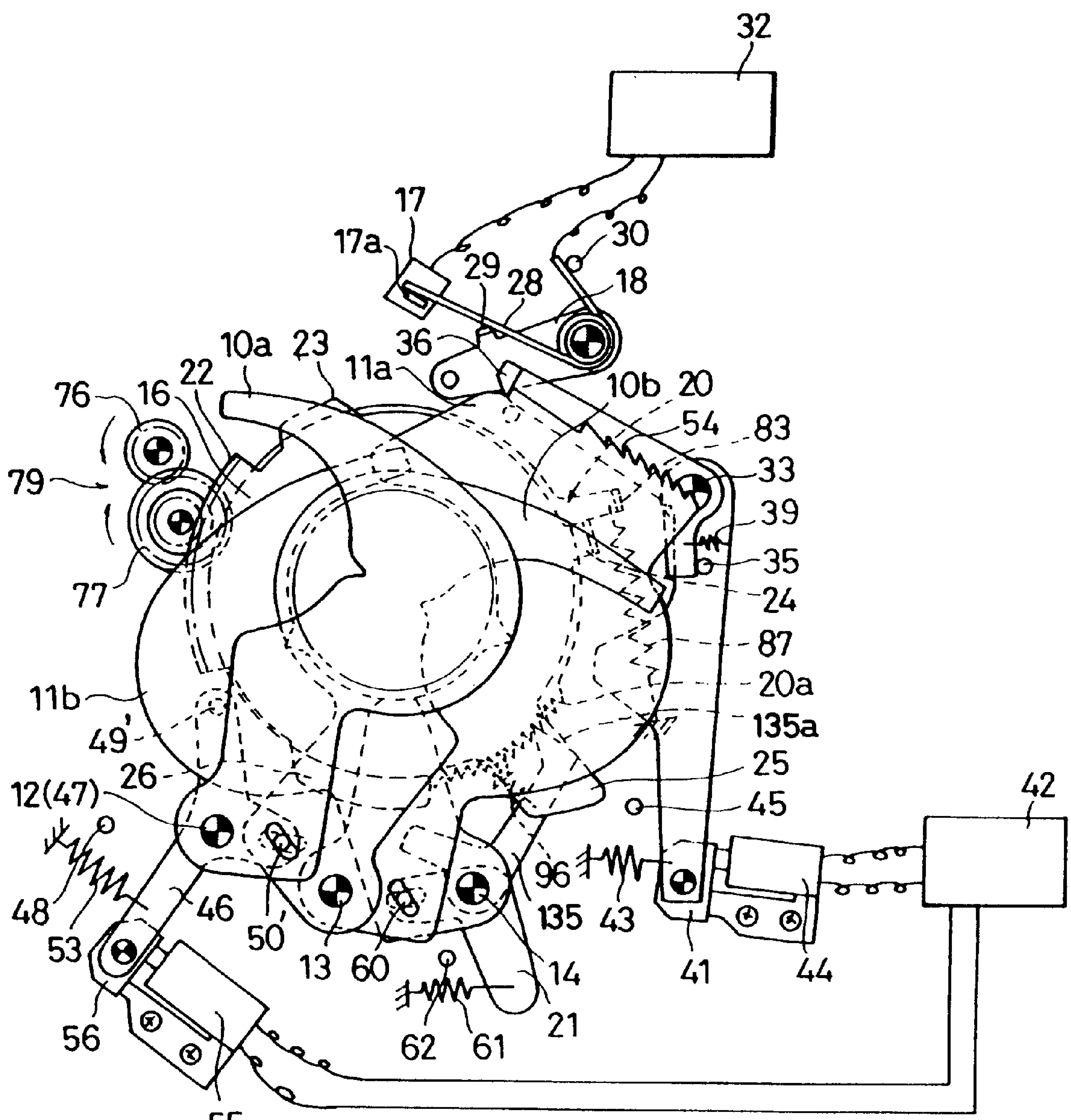
Fig. 24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135a
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50'
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135
43
53
13
60
14
41
44
56
21
62
61
55

Fig.25

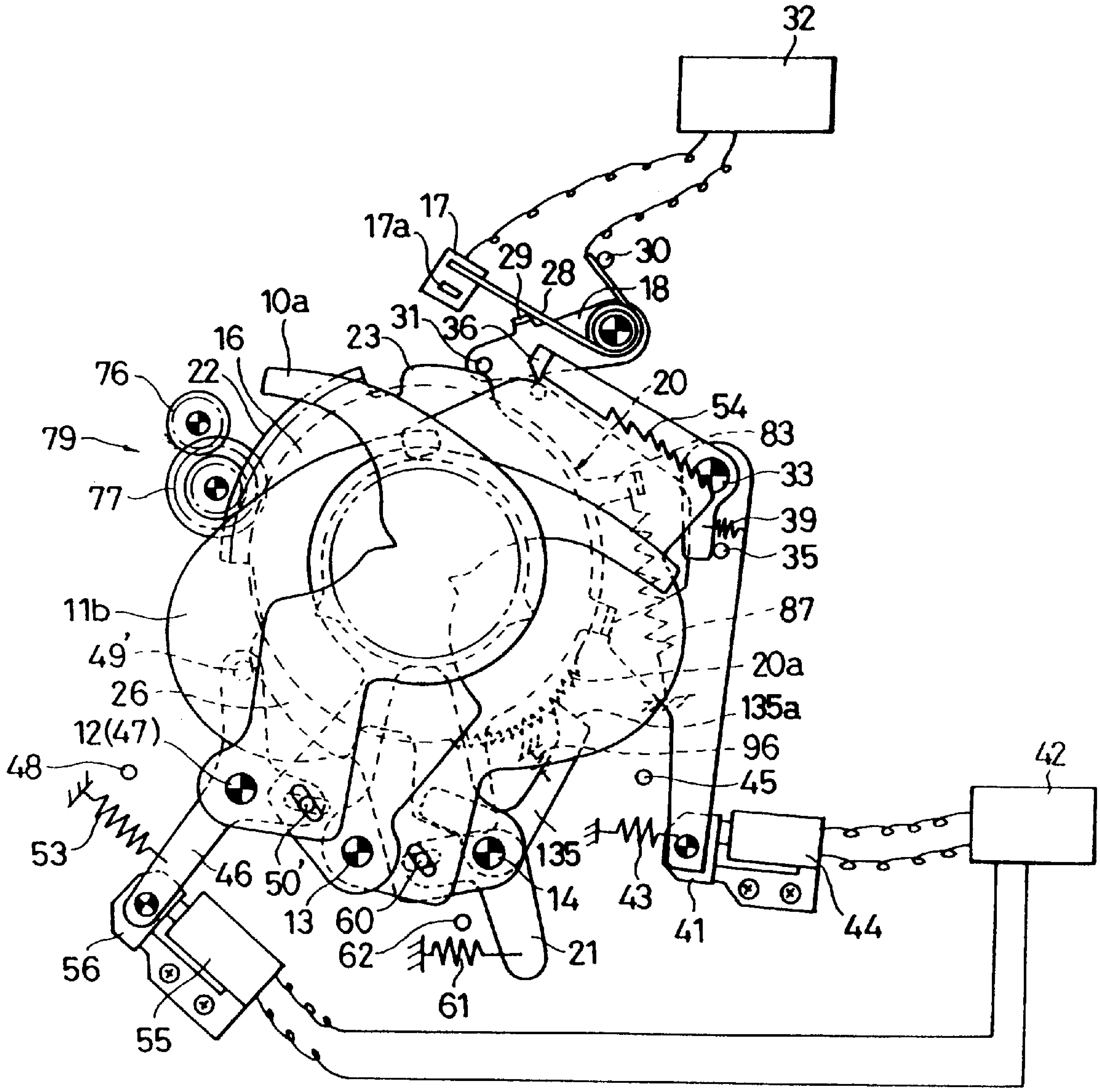
32
17a
17
29
28
30
18
10a
31
36
23
16
20
76
22
54
83
79
33
77
39
35
11b
87
49'
20a
26
135a
12(47)
96
48
45
42
53
135
43
46
50'
14
13
60
41
44
62
21
56
61
55

Fig. 26

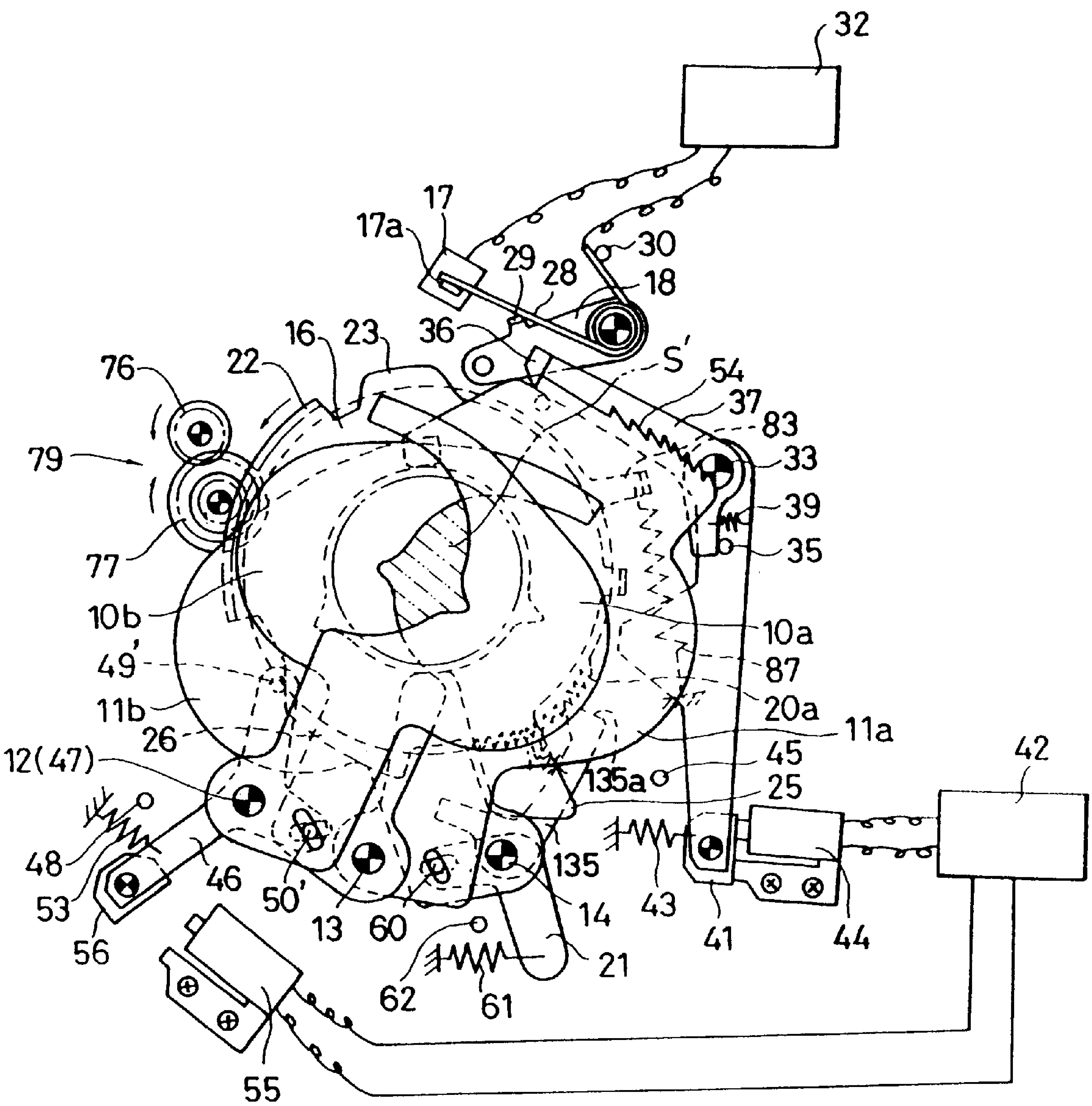
32
17
17a
29
28
30
18
36
16
23
S'
54
37
83
33
39
35
76
22
79
77
10b
10a
49'
87
20a
11b
11a
26
12(47)
45
135a
25
42
48
53
46
50'
13
60
14
135
43
41
44
56
62
61
21
55

Fig. 27

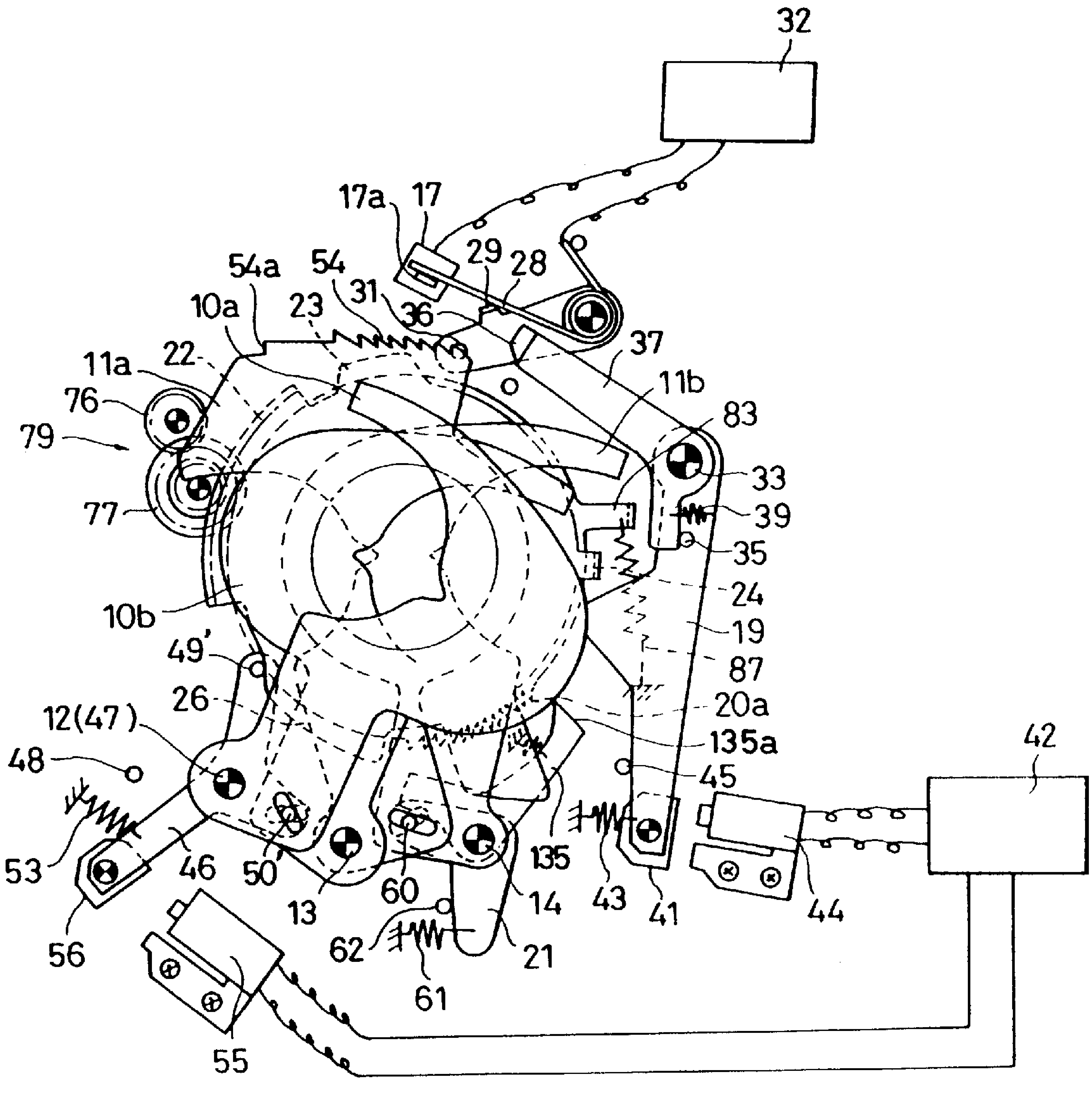
32
17a
17
29
28
54a
54
31
36
10a
23
37
11a
22
11b
83
76
79
33
77
39
35
10b
24
19
49'
87
26
20a
12(47)
135a
42
48
45
53
46
50
13
60
14
135
43
41
44
56
62
21
61
55

Fig. 28

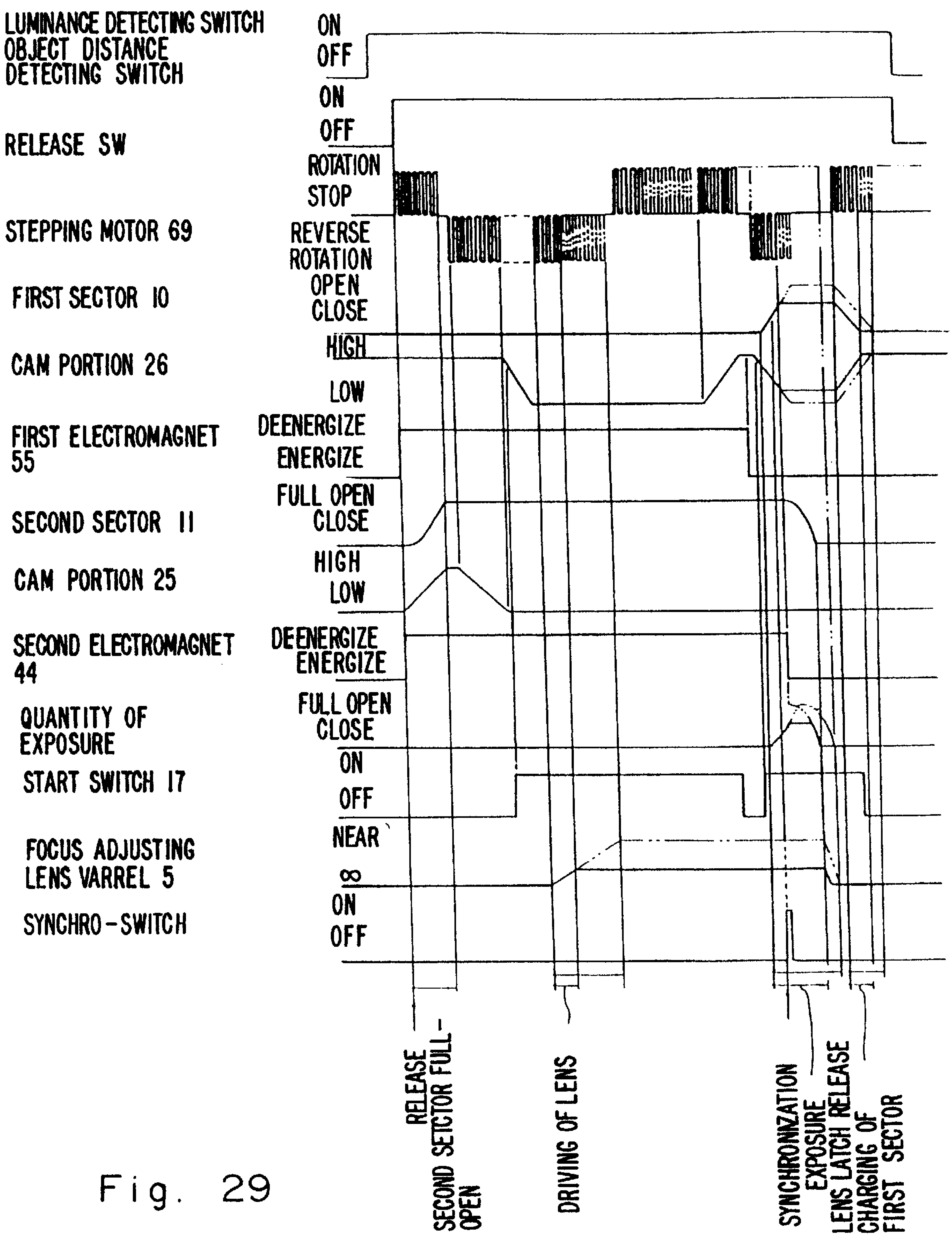
LUMINANCE DETECTING SWITCH
OBJECT DISTANCE DETECTING SWITCH
ON
OFF
RELEASE SW
ON
OFF
STEPPING MOTOR 69
ROTATION
STOP
REVERSE ROTATION
FIRST SECTOR 10
OPEN
CLOSE
CAM PORTION 26
HIGH
LOW
FIRST ELECTROMAGNET 55
DEENERGIZE
ENERGIZE
SECOND SECTOR 11
FULL OPEN
CLOSE
CAM PORTION 25
HIGH
LOW
SECOND ELECTROMAGNET 44
DEENERGIZE
ENERGIZE
QUANTITY OF EXPOSURE
FULL OPEN
CLOSE
START SWITCH 17
ON
OFF
FOCUS ADJUSTING LENS VARREL 5
NEAR
∞
SYNCHRO-SWITCH
ON
OFF
RELEASE
SECOND SETCTOR FULL-OPEN
DRIVING OF LENS
SYNCHRONNZATION
EXPOSURE
LENS LATCH RELEASE
CHARGING OF FIRST SECTOR

Fig. 29

SHUTTER DEVICE IN AUTOMATIC FOCUSING AND EXPOSURE 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.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a shutter used in an automatic focus and automatic exposure camera, and more precisely it relates to a shutter in which shutter sectors are opened and closed to actuate (release) a lens shutter. The present invention also relates to a daylight synchro photographing method.

2. Description of the Related Art

In a known automatic focus and exposure camera the focusing control and the exposure control are successively effected in accordance with the release operation. The lens is first moved to a focused position in association with the release operation, and then, the lens shutter is actuated. In such an automatic focusing and automatic exposure camera, more than one sector (shutter blades) are opened and closed to selectively intercept the light path. The exposure value is determined in accordance with the opening operation of the sectors and the shutter speed is determined by a time in which the sectors are closed from the open position.

Thus, in the conventional shutter, since the same sectors are opened and closed for shutter control, it is very difficult to increase the shutter speed. Furthermore, in an attempt to increase the shutter speed, there is difficulty in synchronization of the strobe light emission with the shutter in the daylight synchro mode.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a shutter device having an increased shutter speed.

Another object of the present invention is to provide a shutter device in which strobe light can be emitted synchronously with an increased shutter speed at the daylight synchro mode.

To achieve the objects mentioned above, according to the present invention, there is provided a shutter device for a camera comprising, first and second sector mechanisms which constitute a lens shutter and which are independently opened and closed to define an aperture. A photometer for detecting the luminance of an object to be photographed and diaphragm control device for controlling the aperture defined by the second sector mechanism in accordance with the luminance data detected by the photometer are provided. A shutter opening device for normally closing the first sector mechanism and opening the first sector mechanism when the second sector mechanism is held to define a predetermined aperture determined by the diaphragm control device, and a shutter closing device for closing the second sector mechanism at a predetermined timing in accordance with the luminance data of the photometer means after the first sector mechanism is opened by the shutter opening device are provided.

With this arrangement, the lens shutter can be simply constituted by the operations of the first sector mechanism and the second sector mechanism in combination. Furthermore, a desired shutter speed can be obtained only by the control of the shutter opening device and the shutter closing device, thus resulting in a realization of a high speed shutter. The exposure can be easily controlled by controlling the aperture of the second sector mechanism by the diaphragm control device.

Preferably, the diaphragm control device comprises ratchet teeth provided on the sector blades of the second sector mechanism, and an engaging member which is disengageably engaged by the ratchet teeth to hold or release the sector blades.

With this arrangement, the second sector mechanism can be locked to define a desired diaphragm aperture by the engagement of the ratchet teeth of the second sector mechanism and the engaging member.

According to another aspect of the present invention, there is provided a shutter device for a camera comprising a first sector mechanism which is normally biased to open by a first biasing device, a first sector mechanism abutment for holding the first sector mechanism at an optional aperture, a second sector mechanism which is normally biased to close by a second biasing device, a second sector mechanism abutment for holding the second sector mechanism at an optional aperture. A stepping motor which opens and closes the first and second sector mechanisms camera is provided. The a has a strobe and a photometer for detecting luminance data of an object to be photographed. The a has normal photographing mode in which the second sector mechanism is opened by the stepping motor at a predetermined diaphragm aperture in accordance with the luminance data. Thus, the second sector mechanism is held by the second sector mechanism abutment then, the first sector mechanism abutment means and the second sector mechanism abutment release the first sector mechanism and the second sector mechanism by the first biasing device and the second biasing device to open the first sector mechanism and close the second sector mechanism to complete the exposure. The camera also has a daylight synchro photographing mode in which the second sector mechanism is opened by the stepping motor to hold it by the second sector mechanism abutment. Then, the first sector mechanism is opened at a predetermined diaphragm aperture in accordance with the luminance data by the stepping motor. Finally the second sector mechanism abutment is released to close the second sector mechanism by the second biasing device to complete the exposure. The shutter device further comprising a daylight trigger for sending a light emission signal to the strobe at a predetermined light emission timing before the first sector mechanism provides a predetermined diaphragm aperture, in the daylight synchro photographing mode.

With this construction, the shutter can be simplified and an increased shutter speed can be provided. Since the operation of the first sector mechanism to commence the exposure in the daylight synchro mode can be controlled by the pulses, the motor strobe light can be emitted at a predetermined timing in accordance with a light emission signal synchronous with the pulses.

According to still another aspect of the present invention, there is provided a daylight synchro photographing method in a camera having a first and second sector mechanisms which constitute a lens shutter and which are independently open and closed. The camera also included a strobe, and a photometer for detecting the luminance of an object to be photographed. The method includes the a step of opening the second sector mechanism and holding it to a predetermined open position. The step of opening the first sector mechanism at a predetermined diaphragm aperture in accordance with the luminance data of the object, the step of sending a light emission signal to the strobe at a predetermined timing before the diaphragm aperture defined by the first sector mechanism becomes a predetermined value, and the step of closing the second sector mechanism.

According to this method, since the light emission trigger signal can be supplied to the strobe at a predetermined timing before a desired diaphragm aperture is defined by the first sector mechanism, the strobe light can be appropriately emitted.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described below in detail with reference to the accompanying drawings, in which:

FIG. **1** is an exploded perspective view of a shutter device according to a first embodiment of the present invention;

FIGS. **2** through **6** are front elevational views of a shutter device according to a first embodiment of the present invention, shown in different operational positions;

FIG. **7** is a timing chart of various elements of a shutter device according to a first embodiment of the present invention;

FIG. **8** is an exploded perspective view of a shutter device according to a second embodiment of the present invention;

FIGS. **9** through **13** are front elevational views of a shutter device according to a second embodiment of the present invention, shown in different operational positions;

FIG. **14** is a timing chart of various elements of a shutter device according to a second embodiment of the present invention;

FIG. **15** is an exploded perspective view of a shutter device according to a third embodiment of the present invention;

FIGS. **16** through **21** are front elevational views of a shutter device according to a third embodiment of the present invention, shown in different operational positions in a normal photographing mode;

FIG. **22** is a timing chart of various elements of a shutter device according to a third embodiment of the present invention;

FIGS. **23** through **28** are front elevational views of a shutter device according to a third embodiment of the present invention, shown in different operational positions in a daylight synchro mode; and,

FIG. **29** is a timing chart of various elements of a shutter device according to a third embodiment of the present invention, in a daylight synchro mode.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows an exploded perspective view of a shutter device according to the first embodiment of the present invention.

The shutter device **1** of the present invention has a release portion **2**, a drive portion **3**, a drive mechanism holding block **4** and a focus adjusting lens barrel **5**.

The release portion **2** has annular bases **8** and **9** having holes **6** and **7** having a center on the optical axis O. A first sector mechanism **10** having a pair of sector blades **10***a* and **10***b* and a second sector mechanism **11** having a pair of sector blades **11***a* and **11***b* are provided between the two annular bases **8** and **9**.

The annular base **9** has shafts **12**, **13** and **14**. The sector blade **10***a* is rotatably mounted to the shaft **12**, and the sector blade **11***b* is rotatably mounted to the shaft **14**. The sector blades **10***b* and **11***a* are rotatably mounted to the shaft **13**.

The drive portion **3** has an operational plate **16** which has a center hole **15**. Around the operational plate **16** are provided a switch lever **103** which actuates a start switch **100**, a lever member **110**, an operational ring **20**, a sector lever **113** and an engaging lever **131**, etc.

The operational plate **16** has a hole **15** having a center on the optical axis O. The operational plate **16** is provided on its outer periphery with a gear **22**, a cam portion **23**, and operational lever **24** and cams **25** and **26** in this order.

The start switch **100** has a switch lever **103** (FIG. **2**). The switch lever **103** rotates about a shaft **103***a* about which a torsion spring **101** is provided. The torsion spring **101** bears at its one end against the an abutment bar **102** and at its opposite end against a pin **108** provided on the camera body, so that the switch lever **103** is continuously biased in the counterclockwise direction by the torsion spring to engage the abutment bar **103** against the cam portion **23**. The switch lever **103** rotates in the clockwise and counterclockwise directions in accordance with the cam profile of the cam portion **23**. When the switch lever **103** rotates in the clockwise direction, the one end of the spring **101** comes into contact with the terminal **100***a* of the start switch **100** to turn the switch ON. The opposite ends of the torsion spring **101** are connected to lead wires connected to a motor control circuit **32**.

The lever member **110** is pivoted about the shaft **106** and has at its one end an operational bar member **108** which is guided by the cam member **23** to rotate in the clockwise and counterclockwise directions. The lever member **110** has at its opposite end a lateral bar member **121** and an armature **119**. An electromagnet **118** for the second sector mechanism, which constitutes a shutter closing means is provided to correspond to the armature **119**. The electromagnet **118** is connected to an electromagnet control circuit **42**. A spring **117** is connected to the lever member **110** behind the armature **119** (on the right side in FIG. **2**) to bias the latter in the counterclockwise direction.

The sector lever **113** has bifurcated portions (arms) **105** and **109** above the shaft **111**. The operational bar **107** is mounted to one of the bifurcated arms, e.g. the arm **105**, and a longer operational bar **50** is mounted to the other arm **109**.

The operational bar **107** bears against the cam portion **26** of the operational plate **16**. The longer operational bar **50** extends through an elongated hole **9***b* formed in the annular base **9** and elongated holes **91** and **92** formed in the sector blades **10***a* and **10***b*, respectively. In the initial position of the operational plate **16**, the operational bar **107** is placed on the most raised (highest) portion of the cam portion **26**, and accordingly, the sector lever **113** rotates in the counterclockwise direction against a first sector mechanism opening spring **112**. The armature **115** attached to the selector lever **113** below the shaft **111** is moved to a position in which the armature is attracted by the electromagnet **116** for the first sector mechanism which constitutes the shutter opening means. At the same time, since the upward force is applied to the elongated holes **91** and **92** of the sector blades **10***a* and **10***b* by the operational bar **50**, the sector blade **10***a* and the sector blade **10***b* are rotated in the counterclockwise direction and the clockwise direction to close the first sector mechanism, respectively.

An engaging lever **131** is provided on the side of the lever member **110**. The engaging lever **131** is rotatably supported at one and by a shaft **132** and is biased by a spring **120** at the opposite end of the lever **131** in the counterclockwise direction. A sector association lever **127** is rotatably supported by a shaft **122** to be opposed to a ratchet pawl **130** of the engaging lever **131**. The sector association lever **127** has serrated ratchet teeth **129** which are engaged by the ratchet pawl **130**. The sector association lever **127** is biased by a second sector mechanism closing spring **126** in the clockwise direction. The angular displacement of the sector association lever **127** is restricted by a stop **125** provided on the camera body.

The sector association lever **127** has a sector association bar member **123** which laterally projects therefrom. The association bar member **123** extends through the elongated hole **9***c* of the annular base **9** and the elongated holes **51** and **52** of the sector blades **11***a* and **11***b*, respectively. When the association bar member **123** is pushed down by the cam portion **25** which moves in accordance with the rotation of the operational plate **16**, the sector blades **11***a* and **11***b* are pushed down through the elongated holes **51** and **52**. As a result, the sector blades **11***a* and **11***b* are rotated in the clockwise direction and the counterclockwise direction to open the second sector mechanism **11**, respectively.

The drive mechanism holding block **4** has an intermediate frame **65** and a motor mount **66**. The intermediate frame **65** is provided on its center portion with a female thread portion (threaded hole) **67**. A stepping motor **69** is mounted to the motor mount **66**.

The stepping motor **69** has stators **70** and **71** in a generally V-shape arrangement. A rotor **72** is located at the center (intermediate) portion of the stators **70** and **71**. Coils **73** and **75** are wound around the stators **70** and **71** and are connected to the motor drive control circuit **32** through lead wires. The motor drive control circuit **32** constitutes a diaphragm control means together with the engaging lever **131** and the sector association lever **127**.

The output shaft of the rotor **72** extends through the intermediate frame **65** and has at its front end a pinion **76** which is engaged by a pinion **77** which is in turn in mesh with the gear **22** of the operational plate **16**. The pinions **76** and **77** constitute a reduction gear train **79**.

The intermediate frame **65** and the motor mount **66** have arched grooves **80** and **81** extending along an imaginary circle having a center on the optical axis O, respectively. The intermediate frame **65** is provided on its center portion with a cylindrical portion (boss) **82** in which the operation ring **20** is fitted. An operational bar **83** provided on the operation ring **20** extends through the arched grooves **80** and **81** and is engaged in a bifurcated associated arm **85** which is provided on the focus adjusting lens barrel **5** at the front end of the operational bar **83**.

The focus adjusting lens barrel **5** is provided on its outer periphery with a male thread portion **86** which is in mesh with the female thread portion **67** of the intermediate frame **65**. Accordingly, when the stepping motor **69** is not driven, the focus adjusting lens barrel **5** is rotated by a largest angular displacement in the clockwise direction by the spring **87** to retract the lens to an innermost position. On the other hand, when the stepping motor **69** is driven to rotate the operational plate **16** of example in the counterclockwise direction, a bent portion **24** of the operational plate **16** presses the operational lever **83** of the operation ring **20** after the lapse of a predetermined time. As a result, the operational lever **83** rotates along the profile of the arched grooves **80** and **81**, so that the focus adjusting lens barrel **5** is rotated in the same direction to be advanced.

The motor drive control circuit **32** and the electromagnet control circuit **42** are connected to an arithmetic operation circuit **88** which has therein a luminance detecting means **89** for detecting luminance data of an object to be taken in accordance with the measurement of a photometer switch (not shown), and an object distance detecting means **90** for detecting an object distance data in accordance with an object distance switch (not shown). In FIG. **2**, numeral **48** designates a pin which restricts the rotational movement of the sector lever **113** in the counterclockwise direction, and **113** a pin which restricts the rotational movement of the lever member **110** in the clockwise direction.

The shutter device **1** according to the present invention operates as follows (FIGS. **2** through **7**).

In an initial position shown in FIG. **2** in which both the photometer switch and the object distance switch are turned OFF, the electromagnet **116** for the first sector mechanism and the electromagnet **118** for the second sector mechanism are both deenergized, and the stepping motor **69** is not driven. Namely, the operational plate **16** is maintained at the initial angular position, and accordingly, the operational bar **107** rides on the most raised portion of the cam portion **26** to rotate the sector lever **113** in the counterclockwise direction. As a result, the operation bar **50** is rotated in the same direction to rotate the sector blades **10***a* and **10***b* in the counterclockwise direction and the clockwise direction respectively, to close the shutter thereby, to intercept the optical path.

In this state, since the bar member **123** is in contact with the lowermost portion of the cam member **25**, the sector association lever **127** is rotated by the largest angular displacement in the clockwise direction by the second sector mechanism closing spring **126** to a position in which the angular displacement thereof is restricted by the stop **125**. The operational bar member **108** of the lever member **110** comes into contact with the end of the cam portion **23** so that the lever member **110** is rotated against the spring **117** in the clockwise direction. Since the bar member **121** releases the engaging lever **131**, the lever **131** is rotated by the spring **120** in the counterclockwise direction, so that the ratchet pawl **130** bears against the sector association lever **127**. Consequently, the bar member **123** is moved in the elongated hole **9***c* of the annular base **9** toward the center of the annular base **9** to rotate the sector blades **11***a* and **11***b* to intercept the optical path. Thus, the shutter is closed.

In this state, since there is a predetermined distance between the bent portion **24** of the operational plate **16** and the operational lever **83** of the operation ring **20**, the operation ring **20** is fully rotated in the clockwise direction by the spring **87**. As a result, the operational lever **83** is rotated in the same direction to come into contact with the ends of the arched grooves **80** and **81** of the intermediate frame **65** and the lens frame **66** in the clockwise direction in order to rotate the focus adjusting lens barrel **5** by the largest angular displacement in the same direction. Thus, the lens is retracted into the innermost position.

The switch lever **103** is rotated in the counterclockwise direction when the abutment bar **102** rides on the lower portion of the cam portion **23**, so that one end (contact point) of the spring **101** is separated from the terminal **100***a* to keep the start switch **100** OFF.

When the photometer switch and he object distance switch are turned ON (i.e., when the release switch is pushed down by a half step), the arithmetic operation circuit **88** operates, so that the luminance data and the object distance data are arithmetically calculated by the luminance detecting means **89** and the object distance detecting means **90**, respectively.

When the release switch is made ON, a predetermined number of forward rotation pulses corresponding to the object luminance is sent to the stepping motor **69** from the motor drive control circuit **32** in accordance with the luminance data of the photometer means **89** to rotate the stepping motor **69** in the forward direction (clockwise direction). At the same time, the second electromagnet **118** (for the second sector mechanism) is energized in response to the signal from the electromagnet control circuit **42** in accordance with the arithmetic operation circuit **88** to attract the armature **119**. Similarly, the electromagnet **116** is energized to attract the armature **115**.

As a result, the lever member **110** is attracted at the opposite end thereof, so that it can not be rotated in the counterclockwise direction, even if the operational bar member **108** is disengaged from the cam portion **23**. Similarly, the opposite end of the sector lever **113** is attracted, so that it can not be rotated in the clockwise direction even if the operational bar **107** is disengaged from the cam portion **26**. Simultaneously, the stepping motor **69** receives a predetermined number of forward rotation pulses corresponding to the diaphragm value detected, based on the photometer data, so that the coils **73** and **75** are activated to rotate the rotor **72** in the clockwise direction.

When the rotor **72** causes the operational plate **16** to rotate in the clockwise direction through the reduction gear train **79**, the cam portion **25** gradually pushes the sector association bar member **123** downward. As a result, the sector association bar member **123** is moved radially and outwardly in the elongated hole **9***c* of the annular base **9** to rotate the sector blade **11***a* and the sector blade **11***b* in the clockwise direction and the counterclockwise direction, respectively.

One step of the stepping motor **69** corresponds to one tooth of the ratchet teeth **129** of the sector association lever **127**, which in turn corresponds to one diaphragm value. Therefore, the rotation of the stepping motor **69** by a predetermined number of steps causes the second sector mechanism **11** to open to obtain a desired exposure value.

When the rotor **72** is stopped after it rotates by a predetermined number of steps, the second sector mechanism **11** defines an opening (aperture) S corresponding to a desired exposure value, as shown in FIG. **3**. The ratchet pawl **130** rides on the ratchet teeth **129** tooth by tooth. When the operational plate **16** stops, the sector association lever **123** is locked at the position of the engagement of the ratchet pawl **130** with one of the ratchet teeth **129** to hold the second sector mechanism **11** at the open position. In this state, since the first sector mechanism **10** is maintained in a closed position, the shutter opening **59***a* is closed, so that no exposure takes place.

Thereafter, a predetermined number of steps of reverse rotation pulses are generated from the motor drive control circuit **32** to the stepping motor **69** to reverse the rotor **72** in the counterclockwise direction, thereby to rotate the operational plate **16** in the counterclockwise direction through the reduction gear train **79**. As a result, the operational bar **107** is gradually disengaged from the cam portion **26**. Nevertheless, no rotation of the sector lever **113** in the clockwise direction occurs, since the armature **115** is attracted by the first electromagnet **116**. Thus, the first sector mechanism **10** is kept in the closed position. The cam portion **23** causes the abutment bar **102** to move up to rotate the switch lever **103** in the clockwise direction against the torsion spring **101**. Consequently, the one end of the torsion spring **101** comes into contact with the terminal **100***a* of the start switch **100** to make the start switch ON (FIG. **4**). During these operations caused by the rotation of the operational plate **16**, the bent portion **24** of the operational plate **16** does not actuate the focus adjusting lens barrel **5**, since there is a predetermined distance between the bent portion **24** and the operational lever **83**, as mentioned before.

A further rotation of the stepping motor **69** in the counterclockwise direction continues until the number of steps reaches a predetermined value corresponding to the focal position detected by the object distance detecting means **90**. As a result, when the bent portion **24** of the operational plate **16** comes into contact with the operational lever **83** from a predetermined angular position, the operation ring **20** begins rotating in the counterclockwise direction. Consequently, the operational lever **83** moves in the elongated holes **80** and **81** of the intermediate frame **65** and the motor mount **66** to rotate the focus adjusting lens barrel **5** in the same direction, so that the focus adjusting lens barrel **5** is advanced to the focal position. When the focus adjusting lens barrel **5** is moved to the focal position, the stepping motor **69** stops rotating in response to the stop signal from the motor drive control circuit **32**.

As a result, a signal is issued from the electromagnet control circuit **42** to deenergize the electromagnet **116**, thereby to release the armature **115** and accordingly the sector lever **113**. Consequently, the sector lever **113** is rotated in the clockwise direction by the first sector mechanism opening spring **112** (FIG. **5**). The operational bar **50** is moved in the radial and outward direction of the annular base **9** to rotate the sector blades **10***a* and **10***b* in the clockwise direction and the counterclockwise direction respectively, so that the first sector mechanism **10** is fully opened. Since the second sector mechanism **11** is opened at a predetermined aperture (exposure value), as mentioned above, an exposure can be made through the first and second sector mechanisms **10** and **11**.

After the lapse of a predetermined time of exposure determined by the photometer means **89**, the second electromagnet **118** is deenergized in response to the signal of the electromagnet control circuit **42**, so that the armature **119** and accordingly the lever member **110** are released and rotated in the counterclockwise direction by the spring **117**. Since the spring **117** is stronger than the spring **120**, the engaging lever **131** is rotated in the clockwise direction through the bar member **121**. Consequently, the ratchet pawl **130** is disengaged from the ratchet teeth **129** to release the sector association lever **127** (FIG. **6**).

As a result, the sector association lever **127** is rotated in the clockwise direction by the second sector mechanism closing spring **126** until the sector association lever **127** comes into contact with the stop **125**. Since the cam portion **25** is retracted from the sector association lever **123** by the rotation of the operational plate **16**, the sector association lever **123** is moved in the radial and inward direction along the elongated hole **9***c* of the annular base **9**. As a result, the sector blade **11***a* and the sector blade **11***b* are rotated in the counterclockwise direction and the clockwise direction respectively, to close the second sector mechanism **11**, so that the exposure through the opening of the first sector mechanism **10** is finished. After the exposure, the stepping motor **69** rotates in the clockwise direction by a predetermined number of steps of forward rotation pulses from the motor drive control circuit **32** to rotate the operational plate **16** in the clockwise direction, so that the shutter device **1** is returned to the initial position shown in FIG. **2**.

In the illustrated embodiment, the stepping motor **69** causes the second sector mechanism **11** to open at a desired aperture, and the electromagnets **116** and **118** are deenergized at a predetermined timing to obtain a desired exposure value and a desired shutter speed, as mentioned above. It is possible to manually set the aperture of the second sector mechanism **11** and the opening and closing timings of the first and second sector mechanisms **10** and **11**.

The following discussion will be directed to a second embodiment of the present invention, shown in FIG. **8** in which the elements corresponding to those in the above mentioned first embodiment are designated with the same reference numerals.

The start switch **17**, the lever member **19**, the operation ring **20** and the second sector mechanism lever **21**, etc., are provided around the operational plate **16** of the shutter device **1'**.

The start switch **17** has the switch lever **18** which is rotatable about the shaft **27** about which the torsion spring **28** is wound. The torsion spring **28** bears at its one end against the hook **29** and at its opposite end against the pin **30** secured to the camera body to continuously bias the switch lever **18** in the counterclockwise direction. The switch lever **18** has a laterally projecting abutment bar **31** which is guided by the cam portion **23** to rotate in the clockwise and counterclockwise directions. The rotation of the switch lever in the counterclockwise direction causes one end of the spring **28** to come into contact with the terminal **17***a* of the start switch **17** to turn the start switch **17** ON. The opposite ends of the torsion spring **28** are connected to the lead wires connected to the motor drive control circuit **32**.

The lever member **19** is pivoted at its one end by a shaft **33** and has at its center portion a projection **19***a* projecting in the left hand direction in FIG. **8**. The lever **19** has the abutment pin **35** in the vicinity of the shaft **33**. The operational member **37** which is formed by bending one end of the abutment lever **36** is rotatably connected to one end of the lever member **19**. The end of the operational member **37** comes away from and close to the abutment pin **35** provided on the lever member **19**. The spring **39** is provided between the end of the operational member **37** and the lever member **19**, so that the operational member **37** is biased in the counterclockwise direction by the spring **39** to elastically bear against the abutment pin **35**. The rotational displacement of the operational member **37** in the counterclockwise direction is restricted by the positioning pin **40** provided on the shutter device body.

An armature **41** is mounted to the opposite end of the lever member **19**. The second electromagnet **44** for the second sector mechanism, connected to the electromagnet control circuit **42** is provided to be opposed to the armature **41**. The spring **43** is provided behind (on the left side of) the armature **41**, so that when the second electromagnet **44** is not energized, the lever member **19** is rotated in the clockwise direction together with the operational member **37** until the lever member **19** comes into contact with the stop pin **45**.

The abutment lever **36** of the operational member **37** is laterally bent to extend through the hole **9***a* of the annular base **9**, above the sector blade **11***a*. The sector blade **11***a* is provided on its upper portion with arched and serrated ratchet teeth **54**. Consequently, when the sector blade **11***a* is rotated in the clockwise direction, the abutment leer **36** which is elastically engaged with the ratchet teeth **54** by the spring **39** rides on the ratchet teeth **54** tooth by tooth. When the sector blade **11***a* stops rotating, the abutment lever **36** locks the sector blade **11***a* by the engagement of the abutment lever **36** with one of the ratchet teeth **54**.

The first sector mechanism lever **46** is rotatably supported by the shaft **47** and has the bifurcated arms **46***a* and **46***b* above the shaft **47**. The operational bar **49'** is connected to the arm **46***a* and the longer operational bar **50'** is connected to the other arm **46***a*. The operational bar **49'** bears against the cam portion **26** of the operational plate **16**. The operational bar **50'** extends through the elongated hole **9***b* of the annular base **9** and the elongated holes **91** and **92** of the sector blades **10***a* and **10***b*. In the initial position of the operational plate **16**, the operational bar **49'** is placed on the most raised portion of the cam **26**, and accordingly, the first sector mechanism lever **46** is rotated in the counterclockwise direction against the spring **53** to move the armature **56** provided below the shaft **47** to a position in which the armature **56** can be magnetically attracted by the first electromagnet **55**. At the same time, the first sector mechanism **10** is closed, since the upward force of the operational bar **50'** is applied to the elongated holes **91** and **92** of the sector blades **10***a* and **10***b*, so that the sector blades **10***a* and **10***b* are rotated in the counterclockwise direction and the clockwise direction, respectively.

The shutter device **1'** according to the present invention operates as follows (FIGS. **9** through **14**).

In an initial position shown in FIG. **9** in which both the photometer switch and the object distance switch are turned OFF, the electromagnet **55** for the first sector mechanism and the electromagnet **44** for the second sector mechanism are both deenergized, and the stepping motor **69** is not driven. Thus, the operational plate **16** is maintained at the initial angular position, and accordingly, the operational bar **49'** rides on the most raised portion of the cam portion **26** to rotate the sector lever **46** in the counterclockwise direction. As a result, the operation bar **50'** is rotated in the same direction to rotate the sector blades **10***a* and **10***b* in the counterclockwise direction and the clockwise direction respectively, to close the shutter thereby, to intercept the optical path.

In this state, since the sector association bar **60** is in contact with the lowermost portion of the cam member **25** the second sector mechanism lever **21**, is rotated by the largest angular displacement in the clockwise direction by the spring **61** to a position in which the angular displacement thereof is restricted by the stop **62**.

The operational lever **24** of the operational plate **16** comes into contact with the projection **19***a* of the lever member **19**, so that the lever member **19** is rotated against the spring **43**, in the clockwise direction. Consequently, the armature **41** comes into contact with the second electromagnet **44**, and the abutment lever **36** is restricted by the positioning pin **40** and can engage with the ratchet teeth **54** of the sector blade **11***a*.

In this state, since there is a predetermined distance between the operational lever **24** of the operational plate **16** and the operational lever **83** of the operation ring **20**, the operation ring **20** is fully rotated in the clockwise direction by the spring **87**. As a result, the operational lever **83** is rotated in the same direction to come into contact with the ends of the arched grooves **80** and **81** of the intermediate frame **65** and the motor amount **66** in the clockwise direction in order to rotate the focus adjusting lens barrel **5** by the largest angular displacement in the same direction. Thus, the lens is retracted into the innermost position. The switch lever **19** is rotated in the clockwise direction when the abutment bar **31** rides on the most raised portion of the cam **23**, so that one end (contact point) of the spring **28** separates from the terminal **17***a* to keep the start switch **17** OFF.

When the photometer switch and the object distance switch are turned ON, the arithmetic calculation circuit **88** operates, so that the luminance data and the object distance data are arithmetically calculated by the luminance detecting means **89** and the object distance detecting means **90**, respectively.

When the release switch is turned ON, a predetermined number of forward rotation pulses corresponding to the object luminance is sent to the stepping motor **69** from the motor drive control circuit **32** in accordance with the luminance data of the photometer means **89** to rotate the stepping motor **69** in the forward direction (clockwise direction). At the same time, the second electromagnet **44** (for the second sector mechanism) is energized in response to the signal from the electromagnet control circuit **42** in accordance with the arithmetic operation circuit **88** to attract the armature **41**. Similarly, the electromagnet **55** is energized to attract the armature **56**. As a result, the lever member **19** is attracted at the opposite end thereof, so that it can not be rotated in the clockwise direction, even if the projection **19***a* is released from the operational lever **24**. Similarly, the opposite end of the first sector mechanism lever **46** is attracted, so that it can not be rotated in the clockwise direction even if the operational bar **49'** is disengaged from the cam portion **26**. Simultaneously, the stepping motor **69** receives a predetermined number of steps of forward rotation pulses corresponding to the diaphragm value detected, based on the photometer data, so that the coils **73** and **75** are activated to rotate the rotor **72** in the clockwise direction.

When the rotor **72** causes the operational plate **16** to rotate in the clockwise direction through the reduction gear train **79**, the cam portion **25** gradually pushes the sector association bar member **60** downward. As a result, the sector association bar member **60** is moved radially and outwardly in the elongated hole **9***c* of the annular base **9** to rotate the sector blade **11***a* and the sector blade **11***b* in the clockwise direction and the counterclockwise direction, respectively.

One step of the stepping motor **69** corresponds to one tooth of the ratchet teeth **54** of the sector blade **11***a,* which in turn corresponds to one diaphragm value. Therefore, the rotation of the stepping motor **69** by a predetermined number of steps causes the second sector mechanism **11** to open to obtain a desired exposure value.

When the rotor **72** is stopped after it rotates by a predetermined number of steps, the second sector mechanism **11** defines an opening (aperture) S corresponding to a desired exposure value, as shown in FIG. **10**. The abutment lever **36** rides on the ratchet teeth **54** tooth by tooth. When the operational plate **16** stops, the abutment lever **36** is locked to hold the second sector mechanism **11** at the open position. In this state, since the first sector mechanism **10** is maintained in a closed position, the shutter opening **6** is closed, so that no exposure takes place.

Thereafter, a predetermined number of steps of reverse rotation pulses are generated from the motor drive control circuit **32** to the stepping motor **69** to reverse the rotor **72** in the counterclockwise direction, thereby to rotate the operational plate **16** in the counterclockwise direction through the reduction gear train **79**. As a result, the operational bar **49'** is gradually disengaged from the cam portion **26**. Nevertheless, no rotation of the first sector mechanism lever **46** in the clockwise direction occurs, since the armature **56** is attracted by the first electromagnet **55**. Thus, the first sector mechanism **10** is kept in the closed position.

The cam portion **23** causes the abutment bar **31** to be gradually released to rotate the switch lever **18** in the counterclockwise direction by the torsion spring **28**. Consequently, the one end of the torsion spring **28** comes into contact with the terminal **17***a* of the start switch **17** to turn the start switch ON (FIG. **11**). During these operations caused by the rotation of the operational plate **16**, the operational lever **42** does not actuate the focus adjusting lens barrel **5**, since there is a predetermined distance between the operational lever **24** and the operational lever **83** of the operation ring **20**.

A further rotation of the stepping motor **69** in the counterclockwise direction continues until the number of steps reaches a predetermined value corresponding to the focal position detected by the object distance detecting means **90**. As a result, when the operational lever **24** of the operational plate **16** comes into contact with the operational lever **83** of the operation ring **20** from a predetermined angular position, the operation ring **20** beings rotating in the counterclockwise direction. Consequently, the operational lever **83** moves in the elongated holes **80** and **81** of the intermediate frame **65** and the motor mount **66** to rotate the focus adjusting lens barrel **5** in the same direction, so that the focus adjusting lens barrel **5** is advanced to the focal position. When the focus adjusting lens barrel **5** is moved to the focal position, the stepping motor **69** stops rotating in response to the stop signal from the motor drive control circuit **32**.

As a result, a signal is issued from the electromagnet control circuit **42** to deenergize the first electromagnet **55** thereby to release the armature **56** and accordingly the sector lever **46**. Consequently, the sector lever **46** is rotated in the clockwise direction by the spring **53** (FIG. **12**). The operational bar **50'** is moved in the radial and outward direction of the annular base **9** to rotate the sector blades **10***a* and **10***b* in the clockwise direction and the counterclockwise direction respectively, so that the first sector mechanism **10** is fully opened. Since the second sector mechanism **11** is opened at a predetermined aperture (exposure value), as mentioned above, an exposure can be done through the first and second sector mechanisms **10** and **11**.

After the lapse of a predetermined time of exposure determined by the photometer means **89**, the second electromagnet **44** is deenergized in response to the signal of the electromagnet control circuit **42**, so that the armature **41** and accordingly the lever member **19** are released and rotated in the clockwise direction by the spring **43**. The operational member **37** is rotated in the same direction together with the lever member **19**, so that the abutment lever **36** is disengaged from the ratchet teeth **54** of the sector blade **11***a* to release the sector blade **11***a* (FIG. **13**).

As a result, the sector association lever **60** is rotated in the clockwise direction by the spring **61** until the sector association lever **60** comes into contact with the stop **62**. Since the cam portion **25** is retracted from the sector association lever **60** by the rotation of the operational plate **16**, the sector association lever **60** is moved in the radial and inward direction along the elongated hole **9***c* of the annular base **9**. As a result, the sector blade **11***a* and the sector blade **11***b* are rotated in the counterclockwise direction and the clockwise direction respectively, to close the second sector mechanism **11**, so that the exposure through the opening of the first sector mechanism **10** is finished. After the exposure, the stepping motor **69** rotates in the clockwise direction by a predetermined number of steps of forward rotation pulses from the motor drive control circuit **32** to rotate the operational plate **16** in the clockwise direction, so that the shutter device **1'** is returned to the initial position shown in FIG. **9**.

In the illustrated second embodiment, although the ratchet teeth **54** are provided only on the sector blade **11***l* that constitutes the second sector mechanism **11**, it is possible to additionally provide ratchet teeth on the sector blade **11***b* to enhance the diaphragm holding effect of the abutment lever **36**.

The following discussion will be directed to a third embodiment of the present invention, shown in FIGS. **15** through **29** in which the elements corresponding to those in the above mentioned first and second embodiments are designated with the same reference numerals.

One of the main features of the third embodiment is directed to the selection of a "normal photographing mode" and a "daylight synchro mode" by a mode selection switch.

The operation ring **20** is provided on its outer periphery with a ratchet teeth **20***a*. Pivoted adjacent to the operation ring **20** is a lens abutment lever **135** which has at its one end a pawl **135***a* and which is rotatable about a shaft **136**. The spring **137** is provided between the opposite end of the lens abutment lever **135** and the body of the shutter device, so that the lens abutment lever **135** is rotated in the counterclockwise direction by the spring **137**. The rotation of the lens abutment lever **137** is restricted by the bar member **139**. The spring **137** is weaker than the spring **61**. Accordingly, when the second sector lever **21** is rotated in the clockwise direction to come into contact with the positioning pin **62**, the lens abutment lever **135** is pressed up by the bar member **139** at the opposite end of the lens abutment lever to rotate the latter in the same direction.

When the "normal photographing mode" is selected by the mode selection switch (not shown), the shutter device **1**" operates as follows (FIGS. **16** through **22**).

In an initial position shown in FIG. **16** in which both the photometer switch and the object distance switch are turned OFF, the electromagnet **55** for the first sector mechanism and the electromagnet **44** for the second sector mechanism are both deenergized, and the stepping motor **69** is not driven. Namely, the operational plate **16** is maintained at the initial angular position of the normal photographing mode, and accordingly, the operational bar **49**' rides on the most raised portion of the cam portion **26** to rotate the first sector lever **46** in the counterclockwise direction. As a result, the operation bar **50**' is rotated in the same direction to rotate the sector blades **10***a* and **10***b* in the counterclockwise direction and the clockwise direction respectively, to close the shutter, to thereby intercept the optical path.

In this state, since the second sector opening and closing bar **60** is in contact with the lowermost portion of the cam member **25**, the second sector lever **21** is rotated in the clockwise direction by the spring **61** to a position in which the angular displacement thereof is restricted by the stop **62**.

Consequently, the second sector opening and closing bar **60** moves up in the elongated hole **9***c* of the annular base **9** to rotate the sector blades **11***a* and **11***b* in the counterclockwise direction and the clockwise direction respectively, to close the second sector **11**.

The operational lever **24** of the operational plate **16** comes into contact with the projection **19***a* of the lever member **19**, so that the lever member **19** is rotated by a predetermined angular displacement against the spring **43** in the counterclockwise direction. Consequently, the armature **41** comes into contact with the second electromagnet **44**, and the abutment lever **36** is restricted by the positioning pin **40** and can engage with the ratchet teeth **54** of the sector blade **11***a*.

In this state, since there is a predetermined distance between the operational lever **24** of the operational plate **16** and the operational lever **83** of the operation ring **20**, the operation ring **20** is fully rotated in the clockwise direction by the spring **87**. As a result, the operational lever **83** is rotated in the same direction to come into contact with the ends of the arched grooves **80** and **81** of the intermediate frame **65** and the motor mount **66** in the clockwise direction in order to rotate the focus adjusting lens barrel **5** by the largest angular displacement in the same direction. Thus, the lens is retracted into the innermost position. The lens abutment lever **135** is rotated in the clockwise direction against the spring **137**, since the second sector lever **21** is rotated in the clockwise direction until it comes into contact with the positioning pin **62**. Consequently, the pawl **135***a* is located away from the ratchet teeth **20***a* of the operation ring **20**.

The switch lever **18** is rotated in the clockwise direction when the abutment bar **31** rides on the most raised portion of the cam **23**, so that one end (contact point) of the spring **28** separates from the terminal **17***a* to keep the start switch **17** turned OFF.

When the photometer switch and the object distance switch are turned ON, the arithmetic operation circuit **88** operates, so that the luminance data and the object distance data are arithmetically calculated by the luminance detecting means **89** and the object distance detecting means **90**, respectively.

When the release switch is turned ON, a predetermined number of forward rotation pulses corresponding to the object luminance is sent to the stepping motor **69** from the motor drive control circuit **32** in accordance with the luminance data of the photometer means **89** to rotate the stepping motor **69** in the forward direction (clockwise direction). At the same time, the second electromagnet **44** (for the sector mechanism) is energized in response to the signal from the electromagnet control circuit **42** in accordance with the arithmetic operation circuit **88** to attract the armature **41**. Similarly, the first electromagnet **55** is energized to attract the armature **56**. As a result, the lever member **19** is attracted at the opposite end thereof, so that it can not be rotated in the clockwise direction, even if the projection **19***a* is released from the operational lever **24**. Similarly, the opposite end of the first sector mechanism lever **46** is attracted, so that it can not be rotated in the clockwise direction even if the operational bar **49**' is disengaged from the cam portion **26**. Simultaneously, the stepping motor **69** receives a predetermined number of steps of forward rotation pulses corresponding to the diaphragm value detected, based on the photometer data, so that the coils **73** and **75** are activated to rotate the rotor **72** in the clockwise direction.

When the rotor **72** causes the operational plate **16** to rotate in the clockwise direction through the reduction gear train **79**, the cam portion **25** gradually pushes the second sector opening and closing bar **60** downward. As a result, the second sector opening and closing bar **60** is moved radially and outwardly in the elongated hole **9***c* of the annular base **9** to rotate the sector blade **11***a* and the sector blade **11***b* in the clockwise direction and the counterclockwise direction, respectively. The lens abutment lever **135** rotates in the counterclockwise direction in association with the movement of the bar member **139**, and accordingly, the pawl **135***a* comes into contact with a portion of the operation ring **20** other than the ratchet teeth **20***a*.

When the rotor **72** is stopped after it rotates by a predetermined number of steps, the second sector mechanism **11** defines an opening (aperture) S corresponding to a desired exposure value, as shown in FIG. **17**. The abutment lever **36** rides on the ratchet teeth **54** tooth by tooth. When the operational plate **16** stops, the abutment lever **36** is locked to hold the second sector mechanism **11** at the open position and to determine the diaphragm value. In this state, since the first sector mechanism **10** is maintained in a closed position, the shutter opening **6** is closed, so that no exposure takes place.

Thereafter, a predetermined number of steps of reverse rotation pulses are generated from the motor drive control circuit **32** to the stepping motor **69** to reverse the rotor **72** in the counterclockwise direction, thereby to rotate the operational plate **16** in the counterclockwise direction through the reduction gear train **79**. As a result, the operational bar **49'** is gradually disengaged from the cam portion **26**. Nevertheless, no rotation of the first sector mechanism lever **46** in the clockwise direction occurs, since the armature **56** is attracted by the first electromagnet **55**. Thus, the first sector mechanism **10** is kept in the closed position.

The cam portion **23** causes the abutment bar **31** to be gradually released therefrom to rotate the switch lever **18** in the counterclockwise direction by the torsion spring **28**. Consequently, the one end of the torsion spring **28** comes into contact with the terminal **17***a* of the start switch **17** to turn the start switch ON (FIG. **18**). During these operations caused by the rotation of the operational plate **16**, the operational lever **24** does not actuate the focus adjusting lens barrel **5**, since there is a predetermined distance between the operational lever **24** and the operational lever **83** of the operation ring **20**.

A further rotation of the stepping motor **69** in the counterclockwise direction continues until the number of steps reaches a predetermined value corresponding to the focus position detected by the object distance detecting means **90**. As a result, when the operational lever **24** of the operational plate **16** comes into contact with the operational lever **83** of the operation ring **20** from a predetermined angular position, the operation ring **20** begins rotating in the counterclockwise direction. Consequently, the operational lever **83** moves in the elongated holes **80** and **81** of the intermediate frame **65** and the motor mount **66** to rotate the focus adjusting lens barrel **5** in the same direction, so that the focus adjusting lens barrel **5** is advanced to the focus position. The pawl **135***a* of the lens abutment lever **135** rides over the ratchet teeth **20***a* tooth by tooth and engages with one of the ratchet teeth when operation ring **20** stops to lock the operation ring **20** and accordingly the focus adjusting lens barrel **5** at the focus position.

Thereafter, a signal is issued from the electromagnet control circuit **42** to deenergize the first electromagnet **55**, thereby to release the armature **56** and accordingly the sector lever **46**. Consequently, the sector lever **46** is rotated in the clockwise direction by the spring **53** (FIG. **20**). The operational bar **50'** is moved in the radial and outward direction of the annular base **9** to rotate the sector blades **10***a* and **10***b* in the clockwise direction and the counterclockwise direction respectively, so that the first sector mechanism **10** is fully opened. Since the second sector mechanism **11** is opened to a predetermined aperture (exposure value), as mentioned above, an exposure can be made through the first and second sector mechanisms **10** and **11**.

After the lapse of a predetermined exposure time as determined by the photometer means **89**, the second electromagnet **44** is deenergized in response to the signal of the electromagnet control circuit **42**, so that the armature **41**, and accordingly, the lever member **19** are released and rotated in the clockwise direction by the spring **43**. The operational member **37** is rotated in the same direction together with the lever member **19**, so that the abutment lever **36** is disengaged from the ratchet teeth **54** of the sector blade **11***a* to release the sector blade **11***a*. As a result, the second sector opening and closing lever **60** is rotated in the clockwise direction by the spring **61** until the lever **60** comes into contact with the stop pin **62**. Since the cam portion **25** is retracted from the sector association lever **60** by the rotation of the operational plate **16**, the sector association lever **60** is moved in the radial and inward direction along the elongated hole **9***c* of the annular base **9**. As a result, the sector blade **11***a* and the sector blade **11***b* are rotated in the counterclockwise direction and the clockwise direction respectively, to close the second sector mechanism **11**, so that the exposure through the opening of the first sector mechanism **10** is finished (FIG. **21**). In this time, since the lens abutment lever **135** is rotated in the same direction by the bar member **139** which moves in the clockwise direction to press the opposite end of the lens abutment lever **135** upward, the pawl **135***a* is disengaged from the ratchet teeth **20***a* to release the operation ring **20**. As a result, the operation ring **20** is rotated in the clockwise direction by the spring **87** to return the focus adjusting lens barrel **5** to the initial position.

After the exposure, the stepping motor **69** rotates in the clockwise direction by a predetermined number of steps of forward rotation pulses from the motor drive control circuit **32** to rotate the operational plate **16** in the clockwise direction. As a result, the operational bar **49'** of the first sector lever **46** rides on the most raised portion of the cam **26** of the operational plate **16**, and accordingly, the first sector **10** is closed again. Thus, the shutter device **1"** is returned to the initial position shown in FIG. **16**. Immediately before the completion of the charge of the first sector **10**, the abutment bar **31** is placed on the cam **23**, so that the spring **28** is separated from the terminal **17***a* to turn the start switch OFF.

When the "daylight synchro" mode is selected by the mode selection switch (not shown), the shutter device **1"** operates as follows (FIGS. **23** through **29**).

In an initial position in which both the photometer switch and the object distance switch are turned OFF, the shutter device **1"** is as shown in FIG. **16**. When the photometer switch and the object distance switch are turned ON, the arithmetic operation circuit **88** operates, so that the luminance data and the object distance data are arithmetically calculated by the luminance detecting means **89** and the object distance detecting means **90**, respectively.

When the release switch is turned ON, the stepping motor **69** rotates by a predetermined number of steps in the forward direction, in accordance with the motor drive control circuit **32**. At the same time, the second electromagnet **44** (for the second sector mechanism) is energized in response to the signal from the electromagnet control circuit **42** in accordance with the arithmetic operation circuit **88** to attract the armature **41**. Similarly, the first electromagnet **55** is energized to attract the armature **56**. As a result, the lever member **19** is attracted at the opposite end thereof, so that it can be rotated in the clockwise direction, even if the projection **19***a* is released from the operational lever **24**. Similarly, the opposite end of the first sector mechanism lever **46** is attracted, so that it can not be rotated in the clockwise direction even if the operational bar **49'** is disengaged from the cam portion **26**.

When the stepping motor **69** rotates by a predetermined number of steps in the forward direction to rotate the operational plate **16** in the clockwise direction through the reduction gear train **79**, the cam portion **25** gradually pushes the second sector opening and closing bar **60** downward. As a result, the second sector opening and closing bar **60** is fully moved in the radial and outward direction in the elongated hole **9**c of the annular base **9** to rotate the sector blade **11**a and the sector blade **11**b in the clockwise direction and the counterclockwise direction, respectively. The abutment lever **36** rides over the ratchet teeth **54** tooth by tooth and engages with the engaging tooth **54**a when the largest angular displacement of the sector blade **11**a in the clockwise direction takes place to hold the second sector mechanism **11** at the full open position (FIG. **23**).

The stepping motor **69** is then stopped. In this state, since the first sector **10** is kept in the closed position, no exposure occurs. The lens abutment lever **135** is rotated in the counterclockwise direction by the movement of the second sector opening and closing bar **60**, so that the pawl **135**a engages with the portion of the operation ring **20** other than the ratchet teeth **20**a.

Thereafter, a predetermined number of steps of reverse rotation pulses are generated from the motor drive control circuit **32** to the stepping motor **69** to reverse the rotor **72** in the counterclockwise direction, thereby to rotate the operational plate **16** in the counterclockwise direction through the reduction gear train **79**. As a result, the operational bar **49'** is generally disengaged from the cam portion **26**. Nevertheless, no rotation of the first sector mechanism lever **46** in the clockwise direction occurs, since the armature **56** is attracted by the first electromagnet **55**. Thus, the first sector mechanism **10** is kept in the closed position.

The cam portion **23** causes the abutment bar **31** to be gradually released therefrom by the rotation of the operational plate **16** to rotate the switch lever **18** in the counterclockwise direction by the torsion spring **28**. Consequently, the one end of the torsion spring **29** comes into contact with the terminal **17**a of the start switch **17** to turn the start switch ON (FIG. **24**). During these operations caused by the rotation of the operational plate **16**, the operational lever **24** does not actuate the focus adjusting lens barrel **5**, since there is a predetermined distance between the operational lever **24** and the operational lever **83** of the operation ring **20**.

A further rotation of the stepping motor **69** in the counterclockwise direction continues until the number of steps reaches a predetermined value corresponding to the focal position detected by the object distance detecting means **90**. As a result, when the operational lever **24** of the operational plate **16** comes into contact with the operational lever **83** of the operation ring **20** from a predetermined angular position, the operation ring **20** begins rotating in the counterclockwise direction (FIG. **25**). Consequently, the operational lever **83** moves in the elongated holes **80** and **81** of the intermediate frame **65** and the motor mount **66** to rotate the focus adjusting lens barrel **5** in the same direction, so that the focus adjusting lens barrel **5** is advanced to the focus position. When the focus adjusting lens barrel **5** is moved to the focus position, the stepping motor **69** stops rotating, in response to the stop signal from the motor drive control circuit **32**. The pawl **135**a of the lens abutment lever **135** rides over the ratchet teeth **20**a tooth by tooth and engages with one of the ratchet teeth when operation ring **20** stops to lock the operation ring **20** and accordingly the focus adjusting lens barrel **5** at the focus position.

Thereafter, the stepping motor **69** rotates in the forward direction by a predetermined number of steps to rotate the operational plate **16** in the clockwise direction (FIG. **26**). After the forward rotation of the stepping motor **69** by a predetermined number of steps, the stepping motor **69** is stopped again, so that the abutment bar **31** rides over the cam portion **23** to turn the start switch **17** OFF, and accordingly, the operational bar **49'** rides over the cam portion **26**.

Thereafter, a signal is issued from the electromagnet control circuit **42** to deenergize the first electromagnet **55**. In this state, since the operational bar **49'** is located on the most raised portion of the cam portion **26** of the operational plate **16**, the state is maintained. Furthermore, the operation ring **20** is not returned to the initial position, since the lens abutment lever **135** engages with the ratchet teeth **20**a. After that, the motor drive control circuit **32** generates a predetermined number of steps of pulses to set a predetermined diaphragm value determined by the object distance data and the strobe guide number. In response thereto, the stepping motor **69** reverses to move the operational bar **49'**, which first comes into slide contact with the cam portion **26** and then comes away therefrom toward a lower position. As a result, the first sector lever **46** is rotated in the clockwise direction by the spring **53**. Accordingly, the sector blades **10**a and **10**b are rotated in the clockwise direction and the counterclockwise direction to gradually close the first sector **10** (FIG. **27**). Thus, the light path which has been intercepted is gradually opened to effect the exposure.

The first sector **10** is opened to a predetermined aperture corresponding to a predetermined exposure value by the reverse rotation of the stepping motor **69** through a predetermined number of steps. The synchro switch (not shown) which constitutes a daylight synchro trigger means is turned ON synchronously with a pulse immediately before a specific pulse at which the aperture becomes a predetermined value to emit strobe light in accordance with the trigger signal thereof.

At the "daylight synchro mode", the position of the object to be photographed is determined in accordance with the object distance data, and the appropriate proper diaphragm value is determined in accordance with the strobe guide number. In case of a close object distance, since the diaphragm aperture which is defined by the reverse rotation of the stepping motor **69** is smaller than an open diaphragm value, the reverse rotation of the stepping motor **69** continues after the strobe light is emitted to increase the aperture defined by the first sector **10**. When the diaphragm value becomes a predetermined value which gives a desired exposure value of the background of the object, the stepping motor **69** is stopped in accordance with the stop signal of the motor drive control circuit **32**. The opening (aperture) thus obtained is represented by S' in FIG. **27**.

Conversely, in case of a far object distance, since the above-mentioned diaphragm value is set to be an open diaphragm value, the stepping motor **69** is stopped after it rotates by one pulse immediately after the strobe light emission, so that no further opening of the first sector **10** takes place. After the lapse of a predetermined time necessary for the appropriate exposure obtained by the photometer means **89**, the second electromagnet **44** is deenergized in accordance with the signal of the electromagnet control circuit **42**. As a result, the lever member **19** is rotated together with the operational member **37** in the clockwise direction by the spring **43**. Consequently, the abutment lever **36** is disengaged from the engaging tooth **54**a to release the sector blade **11**a, so that the sector blades **11**a and **11**b are rotated in the counterclockwise direction and the clockwise direction by the biasing force of the spring **61** through the second sector opening and closing lever **60**, respectively. Thus, the opening S' is closed to complete the exposure (FIG. **28**).

Since the rotation of the second sector lever **21** in the clockwise direction by the spring **61** causes the bar member **139** to rotate in the same direction, the lens abutment lever **135** is pushed up at the opposite end thereof by the bar member **139**. Since the spring force of the spring **61** is stronger than that of the spring **137**, the lens abutment lever **135** is rotated in the clockwise direction. Consequently, the pawl **135***a* is disengaged from the ratchet teeth **20***a* of the operation ring **20**, so that the operation ring **20** is rotated in the clockwise direction by the spring **87** and returned to the initial position. Thus, the focus adjusting lens barrel **5** is retracted into a position before the operation by the operational lever **83** which rotates in the clockwise direction.

Thereafter, the stepping motor **69** is rotated in the forward direction in accordance with the command signal of the motor drive control circuit **32** to rotate the operational plate **16** in the clockwise direction again. As a result, the operational bar **49'** gradually rides over the cam portion **26**, so that the first sector lever **46** is rotated in the counterclockwise direction against the spring **53** to return the first sector **10** to the closed position. In this moment, since the abutment bar **31** rides over the cam portion **23**, the torsion spring **28** separates from the terminal **17***a* to turn the start switch **17** OFF. Consequently, the stepping motor **69** stops the forward rotation, so that the shutter device **1"** is returned to the initial position shown in FIG. **16**. Thus, all the operations are completed.

We claim:

1. A shutter device for a camera comprising:

first and second sector mechanisms comprising a lens shutter and which are independently opened and closed to define an aperture;

photometer means for detecting the luminance of an object to be photographed;

diaphragm control means for controlling the aperture defined by said second sector mechanism in accordance with luminance data detected by said photometer means, said diaphragm control means comprising a stepping motor which rotates by a predetermined number of pulses in accordance with luminance data of said photometer means;

a single drive source for said first and second sector mechanisms, said single drive source comprising: shutter opening means for normally closing said first sector mechanism and opening said first sector mechanism when said second sector mechanism is held to define a predetermined aperture determined by said diaphragm control means; and

shutter closing means for closing said second sector mechanism at a predetermined timing in accordance with the luminance data of said photometer means after said first sector mechanism is opened by said shutter opening means.

2. A shutter device according to claim **1**, wherein said diaphragm control means further comprises an operational plate which is rotated by said stepping motor to open said second sector mechanism.

3. A shutter device according to claim **2**, further comprising a cam mechanism positioned between said stepping motor and said operational plate to determine the angular displacement of said second sector mechanism in accordance with the angular displacement of said operational plate.

4. A shutter device according to claim **1**, wherein said second sector mechanism comprises a pair of sector blades of predetermined shape which are associated with each other to open and close the aperture.

5. A shutter device according to claim **4**, further comprising an engaging member for holding or releasing said sector blades, which is disengageably engaged by ratchet teeth which are directly formed on said sector blades of the said second sector mechanism.

6. A shutter device according to claim **5**, further comprising biasing means for continuously biasing said engaging member to engage with said ratchet teeth.

7. A shutter device according to claim **1**, further comprising biasing means for continuously biasing said second sector mechanism to close the same.

8. A shutter device according to claim **7**, wherein said diaphragm control means comprises a stepping motor which opens said second sector mechanism to a predetermined aperture against said biasing means in accordance with the luminance data of said photometer means, and a second sector abutment means for holding said second sector mechanism at said predetermined aperture against said biasing means.

9. A shutter device according to claim **8**, wherein said shutter closing means comprises releasing means for releasing said engagement of the second sector mechanism by said second sector abutment means.

10. A shutter device according to claim **1**, further comprising biasing means for continuously biasing said first sector mechanism to open.

11. A shutter device according to claim **10**, wherein said shutter opening means comprises a motor which closes said first sector mechanism against said biasing means, and first sector abutment means for holding said first sector mechanism at said closed position and for releasing said first sector mechanism at a predetermined timing.

12. A shutter device according to claim **11**, wherein said motor is a stepping motor which drives said second sector mechanism to a predetermined aperture in accordance with luminance data of said photometer means, said first and second sector mechanisms being actuated by rotation of said stepping motor in the forward and reverse directions.

13. A shutter device according to claim **1**, wherein said camera includes a strobe and a daylight synchro photographing mode, and said shutter device further comprises control means, for sequentially performing:

opening said second sector mechanism and holding said second sector mechanism at the open position;

controlling said first sector mechanism to have an aperture in accordance with luminance data of said photometer means;

scanning a trigger signal to said strobe at a predetermined timing before the aperture of said sector mechanism becomes a predetermined value; and,

closing said second sector mechanism.

14. A shutter device according to claim **13**, wherein said control means further performs increasing the aperture **[**em**]** *of* the second sector mechanism even after the strobe light emission when the object distance is smaller than a predetermined value.

15. The shutter device according to claim **2**, further comprising a first sector operational bar for operating said first sector mechanism; a second sector operational bar for operating said second sector mechanism, and a plurality of cams provided on the outer periphery of said operational plate.

16. The shutter device for a camera according to claim **1**, wherein said stepping motor actuates said first and second sector mechanisms in accordance with forward and reverse rotation of said stepping motor.

17. A shutter device for a camera comprising first and second sector mechanisms which independently open and close a photographing aperture, and first sector mechanism adapted to open a shutter, said second sector mechanism adapted to set the aperture and close the shutter, said first and second sector mechanisms being controllably moved to open and close the shutter and set the photographing aperture in response to rotation of a stepping motor-driven plate containing a plurality of sector mechanism actuating cam surfaces.

18. The shutter device for a camera according to claim **17**, further comprising control means for sequentially opening and holding said second sector mechanism at the opened position, for positioning said first sector mechanism to have a predetermined aperture in accordance with luminance data of a photometric means, for sending a trigger signal to a strobe at a predetermined time before an aperture defined by said first sector mechanism reaches said predetermined aperture, and for closing said second sector mechanism.

19. The shutter device for a camera according to claim **17**, wherein said second sector mechanism comprises a plurality of sector members, at least one of said members being provided with a plurality of rachet teeth, said rachet teeth being adapted to be disengagably engaged by means for holding said sector members in a predetermined aperture defining position.

20. A shutter device of a camera comprising:

a first sector mechanism which is normally biased to open by first biasing means;

first sector mechanism abutment means for holding said first sector mechanism at an optional aperture;

a second sector mechanism which is normally biased to close by second biasing means;

second sector mechanism *abutment means for holding said second sector mechanism* at an optional aperture; and

a stepping motor, [which opens and closes] *said stepping motor comprising means for opening and closing* said first and second sector mechanism;

said camera comprising a strobe and photometer means for detecting luminance data of an object to be photographed;

said camera comprising a normal photographing mode in which said second sector mechanism is opened by said stepping motor to a predetermined diaphragm aperture in accordance with said luminance data, so that said second sector mechanism is held by said second sector mechanism abutment means, and then, said first sector mechanism abutment means and said second sector mechanism abutment means release said first [biasing means] *sector mechanism* and said second sector mechanism [by said first biasing means and said second biasing means] to open said first sector mechanism and close said second sector mechanism *by said first biasing means and said second biasing means* to complete the exposure; and a daylight synchro photographing mode in which said second sector mechanism is opened by said stepping motor, to hold said second sector mechanism by said second sector mechanism abutment means, and then said first sector mechanism is opened *by said stepping motor* to a predetermined diaphragm aperture in accordance with luminance data [by said stepping motor], and finally said second sector mechanism abutment means is released to close said second sector mechanism by said second biasing means to complete the exposure;

said shutter device further comprising daylight trigger means for sending a light emission signal to said strobe at a predetermined light emission timing before said first sector mechanism provides said predetermined diaphragm aperture, in said daylight synchro photographing mode.

21. A shutter device according to claim **20**, said camera comprising object distance detecting means for detecting the distance of an object to be photographed, and wherein said daylight trigger means controls the light emission timing in accordance with object distance data of said object distance detecting means.

22. A shutter device according to claim **20**, wherein said diaphragm aperture defined by said second sector mechanism is increased by further rotation of said stepping motor even after said strobe light is emitted when the object distance is below a predetermined value.

23. A daylight synchro photographing method in a camera having first and second sector mechanisms which constitute a lens shutter and which are independently opened and closed, a strobe, and [a] photometer means for detecting the luminance of an object to be photographed, comprising [a] *in* sequence;

opening said second sector mechanism and holding said second sector mechanism at a predetermined open position;

opening said first sector mechanism to a predetermined diaphragm aperture in accordance with the luminance data of the object;

sending a light emission signal to said strobe at a predetermined timing before said diaphragm aperture defined by said first sector mechanism becomes a predetermined value; and

closing said second sector mechanism.

24. A shutter device for a camera comprising:

first and second sector mechanisms comprising a lens shutter adapted to be independently opened and closed to define an aperture;

photometric means for detecting the luminance of an object to be photographed;

diaphragm control means for controlling an aperture defined by said second sector mechanism in accordance with luminance data detected by said photometric means;

shutter opening and closing means for moving said first sector mechanism from a closed position to an opened position when said second sector mechanism defines an aperture, and moving said second sector mechanism from an aperture defining position to a closed position a predetermined time after said first sector mechanism is moved to the opened position; and

means for biasing at least one of said first and second sector mechanisms to one of said opened and closed positions.

25. A camera comprising:

photometry means for providing luminance data of an object to be photographed;

first and second sector mechanisms which are independently openable and closable, said first and second sector mechanisms comprising a lens shutter;

operation means for controlling an aperture defined by said second sector mechanism, said operation means comprising a stepping motor operable to rotate by a predetermined amount in accordance with luminance data provided by said photometry means;

shutter opening means for normally closing said first sector mechanism and for opening said first sector mechanism when said second sector mechanism is held to define a predetermined diaphragm aperture controlled by said operation means; and *shutter closing means for closing said second sector mechanism at a predetermined timing in accordance with luminance data provided by said photometry means, after said first sector mechanism is opened by said shutter opening means,*

wherein said stepping motor is rotatable for closing said first sector mechanism after said second sector mechanism is closed.

26. The camera according to claim 25, further comprising first sector biasing means for continuously biasing said first sector mechanism to open.

27. The camera according to claim 26, said shutter opening means comprising first sector abutment means operable for holding said first sector mechanism at a closed position and for releasing said first sector mechanism at a predetermined timing, said shutter opening means being movable by said stepping motor, said stepping motor being operable to close said first sector mechanism against a bias of said first sector biasing means.

28. The camera according to claim 27, said first sector abutment means comprising an electromagnet.

29. The camera according to claim 25, further comprising second sector biasing means for continuously biasing said second sector mechanism to close.

30. The camera according to claim 29, said shutter closing means comprising a second sector abutment means operable for holding said second sector mechanism at said predetermined diaphragm aperture, said operation means comprising means for operating said stepping motor to open said second sector mechanism to said predetermined diaphragm aperture against a bias of said second sector biasing means.

31. The camera according to claim 30, said second sector abutment means comprising engaging means for holding said second sector mechanism at said predetermined aperture diaphragm, said shutter closing means comprising releasing means for releasing said engaging means.

32. The camera according to claim 31, said engaging means comprising an operational plate arranged for rotation by said stepping motor, for controlling the aperture defined by said second sector mechanism.

33. The camera according to claim 32, further comprising a cam mechanism provided between said stepping motor and said operational plate to determine angular displacement of said second sector mechanism in association with an angular displacement of said operational plate.

34. The camera according to claim 33, said operational plate comprising ratchet teeth formed thereon, said engaging means further comprising an engaging member for disengagedly engaging said ratchet teeth for holding or releasing said second sector mechanism.

35. The camera according to claim 34, said releasing means comprising an electromagnet.

36. The camera according to claim 30, said second sector mechanism comprising a pair of said second sector blades which are associated with each other for opening and closing.

37. The camera according to claim 36, further comprising ratchet teeth formed on at least one of said second sector blades, said second sector abutment means comprising an engaging member for disengagedly engaging said ratchet teeth for holding said second sector blades, said shutter closing means comprising releasing means for releasing said engaging member.

38. The camera according to claim 37, further comprising biasing means for continuously biasing said engaging member to engage with said ratchet teeth.

39. The camera according to claim 38, wherein said releasing means comprises an electromagnet.

40. The camera according to claim 30, further comprising a strobe unit and a daylight synchro photographing mode, said shutter opening means comprising means movable by said stepping motor, and control means for actuating, in said daylight synchro photographing mode, said operation means to operate said stepping motor in a first direction to rotate, to open and hold said second sector mechanism at an open position, and for actuating said stepping motor to rotate in an opposite direction to move said shutter opening means to open said first sector mechanism to provide an aperture in accordance with luminance data provided by said photometry means when said second sector mechanism is held in said open position, and to provide a trigger signal to said strobe unit at a predetermined timing before an aperture defined by said first sector mechanism becomes a predetermined value.

41. The camera according to claim 39, further comprising a strobe unit and a daylight synchro photographing mode, said shutter opening means comprising means movable by said stepping motor, and control means for actuating, in said daylight synchro photographing mode, said operation means to operate said stepping motor in a first direction to rotate, to open and hold said second sector mechanism at an open position, and for actuating said stepping motor to rotate in an opposite direction to move said shutter opening means to open said first sector mechanism to provide an aperture in accordance with luminance data provided by said photometry means when said second sector mechanism is held in said open position, and to provide a trigger signal to said strobe unit at a predetermined time before an aperture defined by said first sector mechanism becomes a predetermined value.

42. The camera according to claim 40, further comprising object distance detecting means, said control means sending said trigger signal in accordance with object distance data detected by said object distance detecting means.

43. The camera according to claim 41, further comprising object distance detecting means, said control means sending said trigger signal in accordance with object distance data detected by said object distance detecting means.

44. The camera according to claim 42, wherein, when an object distance is smaller than a predetermined value, said control means actuates said operation means to rotate said stepping motor to further open said second sector mechanism even after strobe light emission.

45. The camera according to claim 43, wherein, when an object distance is smaller than a predetermined value, said control means actuates said operation means to rotate said stepping motor to further open said second sector mechanism even after strobe light emission.

46. A method of providing a daylight synchro photographing mode for a camera having first and second sector mechanisms which independently open and close a photographing aperture, said method comprising:

(a) opening the second sector mechanism and holding the second sector mechanism at an open position;

(b) starting an exposure in the daylight synchro photographing mode by opening the first sector mechanism to a predetermined diaphragm aperture in accordance with luminance data of an object to be photographed;

(c) actuating a strobe at a predetermined timing before a diaphragm aperture defined by the first sector mechanism becomes a predetermined value; and

(d) closing said second sector mechanism to finish an exposure in the daylight synchro photographing mode.

47. A shutter device for a camera comprising:

first and second sector mechanisms comprising a lens shutter and which are independently opened and closed;

photometering means for detecting luminance of an object to be photographed;

diaphragm control means, responsive to luminance data of said photometering means, for controlling an aperture defined by said second sector mechanism in accordance with the luminance data detected by said photometering means;

shutter opening means for normally closing said first sector mechanism and opening said first sector mechanism when said second sector mechanism is held to define a predetermined aperture defined by said diaphragm control means;

shutter closing means for closing said second sector mechanism at a predetermined timing in accordance with the luminance data of said photometering means after said first sector mechanism is opened by said shutter opening means; and

a single drive source, said single drive source comprising said shutter opening means and said shutter closing means.

48. A shutter device for a camera according to claim 47, and further comprising means for returning said first sector mechanism to a closed state after said second sector mechanism is closed, said returning means comprising a stepping motor and means for rotating said stepping motor in a first direction to determine an aperture defined by said second sector mechanism, and rotating said stepping motor in a direction opposite said first direction for returning said first motor mechanism to the closed state after the second sector mechanism is closed.

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