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(54) Apparatus for automatically extinguishing heater

(57) An apparatus for automatically turning off a heater is disclosed. A sensor for carbon dioxide and carbon oxide (30), temperature sensor (40), or a timer (13) for the heater is set. When measured data are out of the setting condition, the burner wick (2) is automatically lowered down so that a heater is automatically extinguished. By doing so, lack of oxygen due to carbon dioxide, gas suffocation and possible fire may be prevented.

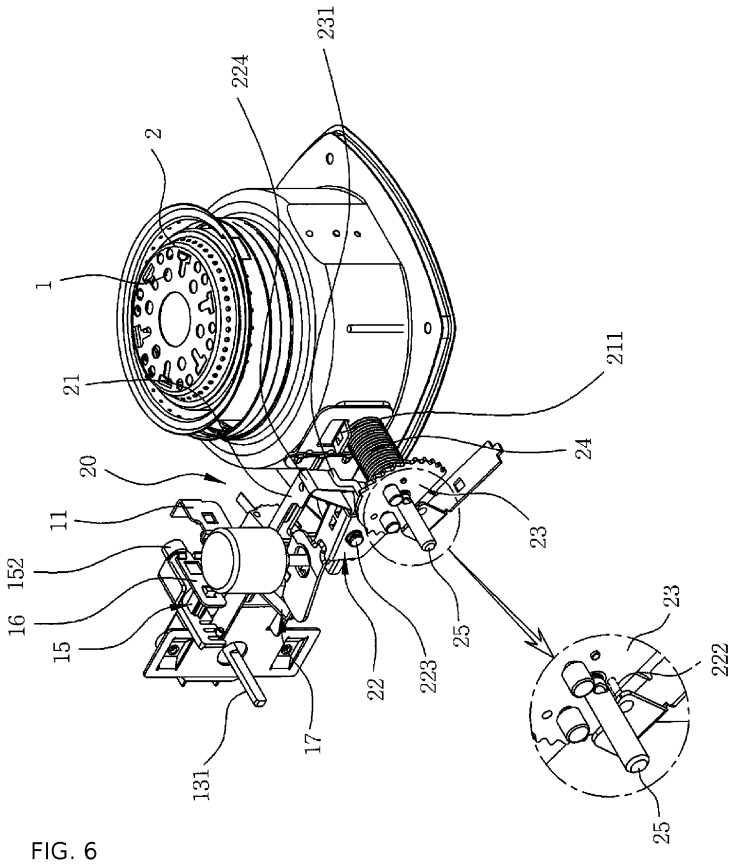

FIG. 6

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates generally to an apparatus for automatically extinguishing a heater, and more particularly, to an apparatus for automatically extinguishing a heater when the quantities of carbon dioxide and carbon monoxide inside a heater, temperature of the heater, or using time of the heater are set to conditions and when the heater is out of the conditions.

Description of the Related Art

[0002] In general, a heater employing wick uses liquid d fossil fuel such as petroleum, heating oil, etc., and combusts the fossil fuel to product heat for heating. The heater draws up fuel mainly through the wick to be burnt directly or by a burner. That is, the heater includes wick installed in a burning chamber that is installed in a main body and a heat radiating chamber coupled with the top of the burning chamber. In this heater, when the top of the wick which is exposed into the burning chamber is ignited by an igniter that is installed at a side of the burning chamber, air is introduced into the burning chamber through a vent formed in the lower side of the main body so that burning is accelerated.

[0003] In the existing heater as described above, a user directly manipulates a distinguishing switch for distinguishing fire.

[0004] If a user goes out or falls asleep while turning on the heater, undesired consumption of fuel cannot be avoided and there is a risk of fire.

[0005] In order to overcome the above-mentioned problems, this application have filed a Korean Patent Application for an apparatus for automatically distinguishing a heater and now granted (Korean Patent No. 0982803, Sep.10, 2010).

[0006] The apparatus for automatically distinguishing a heater disclosed in the Patent includes a timer driver having a rotary gear device coupled with a timer and an elastic rotation device to which a rotation force is transmitted from the rotary gear device to generate an elastic driving force.

[0007] However, the timer driver, namely, the rotary gear device and the elastic rotation device are complicated mechanical assemblies which are driven by the connection between a plurality of gear boxes, have an error of exceeding 20% with respect to a set time of the timer, are difficult to be designed compact.

[0008] Moreover, the increased number of parts causes high percent defective and manufacturing costs to rise.

SUMMARY OF THE INVENTION

[0009] The present invention has been made in view of the above problem, and the present invention provides an apparatus for automatically distinguishing a heater by automatically lowering a wick that catches on fire when quantities of carbon dioxide and carbon oxide, temperature, and use time of the heater are off preset conditions, such that error with respect to a preset time of a timer may be reduced by modifying a driving device into a simple electrically driven device, that a compact outer appearance may be available, that percent defective may be significantly reduced, and that manufacturing costs may be reduced.

[0010] In accordance with the aspects of the present invention, there is provided an apparatus for automatically distinguishing a heater including: a sensing device; and a connection-operation device including a plurality of assemblies disposed between the sensing device and a wick driving shaft of a wick elevator elevating and lowering a wick such that the wick is automatically lowered by a sensing signal from the sensing device; wherein the connection-operation device includes a driving device including a vibration motor driven by a control signal from a controller which receives the sensing signal from the sensing device and a rotation bracket to which an eccentric force is transmitted from the vibration motor and which rotates about a lever rotation shaft; and a follower device including a latchet device driven by a driving force transmitted from the driving device to transmit a rotation force in only one direction and to restrict the rotation force in the opposite direction and a wick driving device rotating the wick driving shaft in association with the latchet device.

[0011] The sensing device includes one of the group of a carbon dioxide and carbon oxide sensor, a temperature sensor, and a timer or a combination thereof.

[0012] The rotation bracket is integrally formed with the vibration motor and on one side of which an operative lever is installed so as to transmit a rotation force to the latchet device of the follower device.

[0013] The apparatus may further include a restoring device connected with the latchet device to return the rotation force of the follower device to the driving device.

[0014] The restoring device includes: a return lever fixed to the latchet gear; an elastic plate fixed to the bracket latchet and receiving an operative force of the return lever; and a micro-switch installed at a lower end of a follower lever of the bracket latchet, applying an off signal to a power supply of the vibration motor through electric contact by pressing of the follower lever, and enabling applying of electric power to the vibration motor as a switch lever returns to an original state when the pressing of the follower lever is released by the restoring device.

[0015] According to the apparatus for automatically distinguishing a heater of the present invention, the driving device is modified into a simple electrically driven device such that error with respect to a preset time of a

timer may be reduced and that a compact outer appearance may be available.

[0016] Moreover, the reduced number of parts may make percent defective significantly down so that manufacturing costs may be saved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The objects, features and advantages of the present invention will be more apparent from the following detailed description in conjunction with the accompanying drawings, in which:

FIGS. 1 to 3 are circuit diagrams illustrating an apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention;

FIGS. 4 and 5 are perspective views illustrating the heater to which the apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention is applied;

FIG. 6 is an exploded perspective view illustrating a driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention;

FIG. 7 is a view illustrating a state before the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention is driven;

FIG. 8 is a view illustrating a state after the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention is driven;

FIGS. 9 and 10 are views illustrating operative state of a follower device including the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0018] Hereinafter, exemplary embodiments of the present invention are described in detail with reference to the accompanying drawings.

[0019] FIGS. 1 to 3 are circuit diagrams illustrating an apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention, FIGS. 4 and 5 are perspective views illustrating the heater to which the apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention is applied. FIG. 6 is an exploded perspective view illustrating a driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention.

[0020] As illustrated in FIGS. 1 to 3, an apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention includes an automatic sensing device having a carbon dioxide and carbon oxide sensor 30, a temperature sensor 40, or a timer 13 and is applied to a heater in which a wick 2 absorbing fuel is burnt to generate heat.

[0021] The automatic sensing device, as illustrated in FIGS. 2 and 3, may be made by the combinations of two sensing elements such as a combination of the carbon dioxide and carbon oxide sensor 30 and the timer 13 and of the temperature sensor 40 and the timer 13, or by a single element such as the timer 13, as illustrated in FIG. 3.

[0022] Here, when measurements such as the quantity of carbon dioxide or carbon oxide and temperature, measured by the carbon dioxide and carbon oxide sensor 30 and the temperature sensor 40, in the heater are out of reference data or when use time of the heater set by the timer 13 reaches at a preset use time of the heater, the driving device 10 of the automatically distinguishing apparatus is driven under the control signal from a controller (not shown) such that the wick 2 that is burning is lowered down and is distinguished.

[0023] Hereinafter, the apparatus for automatically distinguishing a heater will be described as employing a timer 13, as illustrated in FIGS. 4 and 5, from the a carbon dioxide and carbon oxide sensor 30 a temperature sensor 40, and the timer 13 that transmit sensing signals to the controller such that the heater is automatically distinguished.

[0024] To this end, as illustrated in FIGS. 4 and 5, the automatic distinguishing apparatus, operated between the timer 13 setting time and a lever (not shown) of a wick elevator elevating the wick 2, includes a driving device 10 transmitting a driving force of the timer 13 to a plurality of assemblies as connection-operation devices.

[0025] In addition, the automatic distinguishing apparatus includes a follower device 20 transmitting a force generated by striking of an operative lever 17 provided in the driving device 10 to the plurality of assemblies and lowering the wick 2 using the transmitted force.

[0026] The driving device 10, as illustrated in FIG. 6, is installed on a base plate 11 having a fastening member (not shown) such that the automatic distinguishing apparatus may be installed at a specific placed.

[0027] The timer 13, which is provided at a side of the base plate 11 and shares a timer driving shaft 131, is classified into one using clockwork and the other using a small electric motor.

[0028] The timer 13 is a device informing a setting time to a user as the clockwork or the electric motor returns to the initial state when a desired time is set with the clockwork or the electric motor. When the timer 13 informs that the heater using time reaches the setting time, a vibration motor 15 as a driving motor is driven by a control signal from the controller (not shown).

[0029] The vibration motor 15 used as a vibration source is rotatably installed on the base plate 11.

[0030] That is, as illustrated in FIG. 6, the vibration

motor 15 is mounted on the upper end of a rotation bracket 16 including a bracket assembly having the operative lever 17 provided at the lower side.

[0031] Thus, the vibration motor 15 and the rotation bracket 16 is integrally formed with each other and rotate about a lever rotation shaft 161 on the base plate 11.

[0032] In this case, between a side of the rotation bracket 16 located opposite to the operative lever 17 and the base plate 11, a first elastic member 162 is connected.

[0033] In this case, the first elastic member 162 makes the rotation bracket 16 and the operative lever 17 be smoothly rotated about the lever rotation shaft 161 when the rotation bracket 16 and the operative lever 17 are rotated by the centrifugal force of the vibration motor 15.

[0034] The vibration motor 15 makes vibration while an eccentric weight 152 that is mounted on a motor shaft 151 rotates when a rotor (not shown) of the vibration motor 15 such that the vibration is generated by the eccentric weight 152 of the motor shaft 151 when the vibration motor 15 is rotated by a driving signal from the controller.

[0035] When the centrifugal force of the eccentric weight 152 that is mounted on the motor shaft 151 of the vibration motor 15, that is, eccentric force exerts in the gravitational direction, the rotation bracket 16 integrally formed with the vibration motor 15 rotates about the lever rotation shaft 161 by the eccentric force of the vibration motor 15 as illustrated in FIG. 4.

[0036] In other words, when the vibration motor 15 rotates clockwise about the lever rotation shaft 161 by the eccentric force of the eccentric weight 152, the operative lever 17 of the rotation bracket 16 also rotates counterclockwise, that is, upwardly.

[0037] The driving device 10 transmits the eccentric force of the vibration motor 15 that is driven by the controller to the operative lever 17 when the heater using time reaches at the setting time, and may substitute an existing mechanical devic**e** of an automatic distinguishing apparatus of a heater, in which a plurality of gear assemblies that are connected to each other are sequentially driven and transmit a rotational driving force.

[0038] Moreover, as illustrated in FIG. 6, a micro-switch 18 in which a switch lever 181 is disposed parallel to the operative lever 17 is installed at a side of the rotation bracket 16.

[0039] The micro-switch 18, when the operative lever 17 returns to the initial state by the pressing of a follower lever 221 connected with an elastic plate 224 of a later-described bracket latchet 22 where the heater is distinguished, applies an off-signal to a power supply of the vibration motor 15 by the electric contact due to the elastic movement of the switch lever 181.

[0040] In other words, the controller received the off-signal from the micro-switch 18 transmits a stop command to the vibration motor 15.

[0041] After that, when a lever (not shown) of the wick elevator is rotated clockwise, the follower lever 221 of the bracket latchet 22 engaged with the lever is elevated and releases the pressing, the switch lever 181 of the micro-switch 18 returns to the initial state and may apply electric power to the vibration motor 15 (power supplying state).

[0042] The power supplying state to the vibration motor 15 means a state that the controller senses the setting time of the timer 13 and transmits a control signal and a state that the carbon dioxide and carbon oxide sensor 30 and the temperature sensor 40 sense the quantity of carbon dioxide and carbon oxide and temperature in the heater under the control signal from the controller and transmit the sensed data.

[0043] Moreover, the switch lever 181 is not rotated by the lever rotation shaft 161 like the operative lever 17 but is made of an elastic material and is elastically deformed to perform a switching function.

[0044] Meanwhile, the operative lever 17, as described above, includes a spring connector 171 provided at a side from the lever rotation shaft 161 and connected to the first elastic member 162 and a striking unit 172 striking a side of the bracket latchet 22 that is provided to the follower device 20.

[0045] Thus, the driving device 10 transmits the rotation driving force of the timer 13 to the operative lever 17 such that the rotation driving force of the timer 13 is transmitted to the follower device 20 while connected assemblies are sequentially rotated.

[0046] The follower device 20 includes a plurality of assemblies and is installed a base bracket 21.

[0047] On the base bracket 21, the bracket latchet 22 is installed. The bracket latchet 22 includes the follower lever 221 provided at a side from a latchet rotation shaft 223 and making a contact with the operative lever 17 and a pin having a pawl function and provided at the opposite side to selectively restrict a later-described latchet gear 23 and rotates about the latchet rotation shaft 223.

[0048] In addition, on the bracket latchet 22, a reversed U-shaped elastic plate 224 is adjacent to and crosses a later-described wick driving shaft 25.

[0049] One side of the elastic plate 224 is fixed to a rear end of the follower lever 221 of the bracket latchet 22 and the other side of the elastic plate 224 make a contact with a return lever 231 provided at the rear side of a later-described latchet gear 23.

[0050] The latchet gear 23 rotates with the return lever 231 only in one direction by the pin 222 of the bracket latchet 22 and is provided on the same axis as a lever (not shown) elevating the wick 2.

[0051] The latchet gear 23 as a latchet device is fixed to a wick driving shaft 25 connected to the lever (not shown) manually elevating the wick 2 in a combustion chamber 1 and rotates only in one direction due to the restriction by the pin 222 provided in the bracket latchet 22 as described above.

[0052] That is, the latchet gear 23 is restricted to rotate counter clockwise by the pin 222.

[0053] At the lower end of the latchet gear 23, a cutting portion 232 that is not interfered with the pin 222 is

formed.

[0054] When operation of the automatic distinguishing apparatus is finished and the wick driving shaft 25 returns to its initial state, the pin 222 is inserted into the cutting portion 232 of the latchet gear 23 such that the follower lever 221 presses the operative lever 17 to the lowest end.

[0055] On the contrary, when the pin 222 moves downward by the lever, since the follower leer 221 is elevated about the latchet rotation shaft 223 and releases the contact by the pressing of switch lever 181 of the micro-switch 18, the switch lever 181 of the micro-switch 18 returns to its initial state so that the vibration motor 15 may be supplied with electric power.

[0056] A second elastic member 24 as a wick driving device that exerts in the winding direction and that provides an elastic restoring force counterclockwise when the wick driving shaft 25 rotates with the latchet gear 23 in one direction, that is, clockwise, is wound around the wick driving shaft 25.

[0057] In this case, the second elastic member 24, as illustrated in FIGS. 4 and 5, includes an end fixed to the wick driving shaft 25 and the other end fixed to a fixing body 211 of the base bracket 21 that is adj acent to the wick driving shaft 25.

[0058] The second elastic member 24 may be a spring such as coil spring which is wound or released according to the rotation direction of the wick driving shaft 25 and a diameter of which is varied so as to store torsion energy when the wick driving shaft 25 rotat), and the present invention is not limited thereto.

[0059] When the wick driving shaft 25 rotates (in a rotatable direction), if the second elastic member 24 fixed to the wick driving shaft 25 provides an elastic restoring force in the reverse direction, the wick driving shaft 25 rapidly rotates freely in the direction reverse to the operation direction due to the elastic restoring force of the second elastic member 24 when the latchet gear 23 is not restricted by the pin 222 of the bracket latchet 22.

[0060] Since structure and operation of the wick driving shaft 25 elevating the wick 2 within the combustion chamber 1 is already known, its detailed description will be omitted.

[0061] Meanwhile, when the wick 2 is lowered down by the automatic distinguishing apparatus and the heater is distinguished, the automatic distinguishing apparatus drives the assemblies of the driving device 10 and the follower device 20 in the order of reverse to the operating order of the assemblies to set the initial state again.

[0062] As described above, a restoring device returning the automatic distinguishing apparatus to the initial state is a return lever 231 which integrally protrudes from the rear side of the latchet gear 23 and which provides a thrust force to the elastic plate 224 instantly while rotating with the latchet gear 23 when the latchet gear 23 is not restricted by the pin 222 of the bracket latchet 22 and is rotated counter clockwise by the elastic restoring force of the second elastic member 24 that is fixed to the wick driving shaft 25.

[0063] The return lever 231 provides the thrust force instantly to the opposite side of the elastic plate 224 crossing the wick driving shaft 25 and the side of the elastic plate 224 rotates about the latchet rotation shaft 223 with the bracket latchet 22.

[0064] Hereinafter, operation of the apparatus for automatically distinguishing a heater according to an exemplary embodiment of the present invention will be described with reference to the accompanying drawings.

[0065] FIG. 7 is a view illustrating a state before the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention is driven. FIG. 8 is a view illustrating a state after the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention is driven. FIGS. 9 and 10 are views illustrating operative state of a follower device including the driving device of the apparatus for automatically distinguishing a heater according to the exemplary embodiment of the present invention.

[0066] First, a lever (not shown) of the wick elevator coupled with the wick driving shaft 25 and elevating the wick 2 is rotated clockwise to elevate the wick 2 over the combustion chamber 1 and the wick 2 is lighted for heating.

[0067] At this time, since the second elastic member 24 wound around the wick driving shaft 25 exerts in the winding direction, the second elastic member 24 provides a return force in the opposite direction.

[0068] The bracket latchet 22 as a device for restricting the return force of the second elastic member 24, which is adjacent to the wick driving shaft 25, restricts the counter clockwise rotation of the latchet gear 23 when the pin 222 provided in the bracket latchet 22 is engaged with teeth of the latch gear 23 that is fixed to the wick driving shaft 25.

[0069] In the restricted state of the latchet gear 23, the using time is set by manipulating the lever (not shown) of the timer initial sequential operations of which are enabled.

[0070] The timer 13 in which the using time is set is operated slowly in a preset rotation direction by clockwork or a motor.

[0071] After that, when the timer reaches the set using time, a using time finishing signal is transmitted to the controller and the controller transmits a driving signal to the vibration motor 15 of FIG. 7.

[0072] The vibration motor 15 received the driving signal generates vibration due to rotation of the eccentric weight 152.

[0073] When due to this the eccentric force of the eccentric weight 152 exerts upward and downward, the rotation bracket 16 that is integrally installed with the vibration motor 15, as illustrated in FIG. 8, rotates counter clockwise about the lever rotation shaft 161 by the eccentric force of the vibration motor 15 and at the same time the operative lever 17 rotates and moves upward.

[0074] Up to this, the operation of the driving device 10 is described and next the follower device 20 will be described.

[0075] As illustrated in FIG. 9, the operative lever 17 strikes a side of the bracket latchet 22, that is, the follower leer 221, the bracket latchet 22 rotates about the latchet rotation shaft 223.

[0076] At this time, the pin 222 of the bracket latchet 22 restricting the rotation of the latchet gear 23 moves down and releases the restriction of the latchet gear 23.

[0077] When the latchet gear 23 is released, the latchet gear 23 that is fixed to the wick driving shaft 25, as illustrated in FIG. 10, is rotated counter clockwise by the return force of the second elastic member 24 and the return lever 231 fixed to the rear side of the latchet gear 23 provides the pressing force to the elastic plate 224 of the bracket latchet 22 in association with the latchet gear 23.

[0078] In this case, when the wick driving shaft 25 of the wick elevator rotates counter clockwise, the wick 2 is lowered down within the combustion chamber 1 so that the heater is distinguished.

[0079] After distinguishing, when an external force is exerted to the elastic plate 224 of the bracket latchet 22 by the return lever 231, the bracket latchet 22 rotates about the latchet 223 in a direction reverse to the initial operation direction and provides a thrust force to the operative lever 17 on the contrary to the initial operation and the operative lever 17 rotates in the initial state and returns to the original state so that the automatic distinguishing apparatus enters the initial setting state.

[0080] The off signal is applied to the power supply of the vibration motor 15 when the follower lever 221 of the bracket latchet 22 returns to the original state and presses the switch lever 181 of the micro-switch 18 so that the vibration motor 15 driven by the driving signal from the controller is stopped to rotate.

[0081] After that, when the lever (not shown) of the wick elevator is rotated clockwise, the pin 222 of the bracket latchet 22 that is inserted in the cutting portion 232 is lowered down due to interference by the latchet gear 23 and raises the follower lever 221 of the bracket latchet 22.

[0082] Due to this, the switch lever 181 of the micro-switch 18 moves upward to the original state and the vibration motor 15 may be supplied with electric power.

[0083] The exemplary embodiments of the present invention are provided for the easy description and understanding of the present invention with specific examples but do not limit the scope of the present invention. It will be appreciated by those skilled in the art that various changes and modifications may be practiced without departing from the spirit of the present invention.

Claims

1. An apparatus for automatically distinguishing a heater comprising:

   a sensing device; and

   a connection-operation device including a plurality of assemblies disposed between the sensing device and a wick driving shaft of a wick elevator elevating and lowering a wick such that the wick is automatically lowered by a sensing signal from the sensing device;

   wherein the connection-operation device includes:

   a driving device including a vibration motor driven by a control signal from a controller which receives the sensing signal from the sensing device and a rotation bracket to which an eccentric force is transmitted from the vibration motor and which rotates about a lever rotation shaft; and

   a follower device including a latchet device driven by a driving force transmitted from the driving device to transmit a rotation force in only one direction and to restrict the rotation force in the opposite direction and a wick driving device rotating the wick driving shaft in association with the latchet device.

2. The apparatus of claim 1, wherein the sensing device comprises one of the group of a carbon dioxide and carbon oxide sensor, a temperature sensor, and a timer or a combination thereof.

3. The apparatus of claim 1, wherein the rotation bracket is integrally formed with the vibration motor and on one side of which an operative lever is installed so as to transmit a rotation force to the latchet device of the follower device.

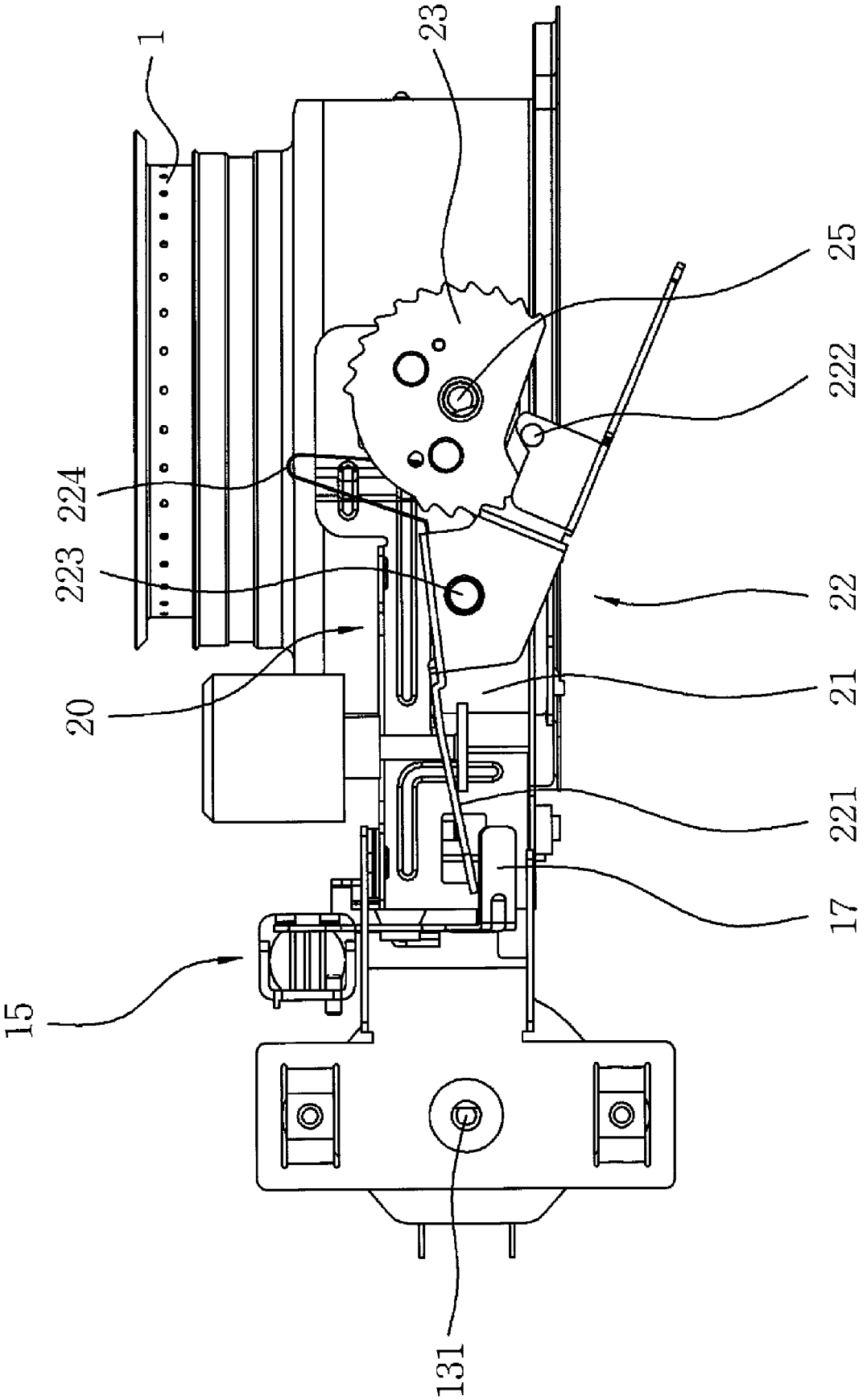
4. The apparatus of any one of claims 1 to 3, further comprising a restoring device connected with the latchet device to return the rotation force of the follower device to the driving device.

5. The apparatus of claim 4, wherein the restoring device comprises:

   a return lever fixed to the latchet gear;

   an elastic plate fixed to the bracket latchet and receiving an operative force of the return lever; and

   a micro-switch installed at a lower end of a follower lever of the bracket latchet, applying an off signal to a power supply of the vibration motor through electric contact by pressing of the follower lever, and enabling applying of electric power to the vibration motor as a switch lever returns to an original state when the pressing of the follower lever is released by the restoring device.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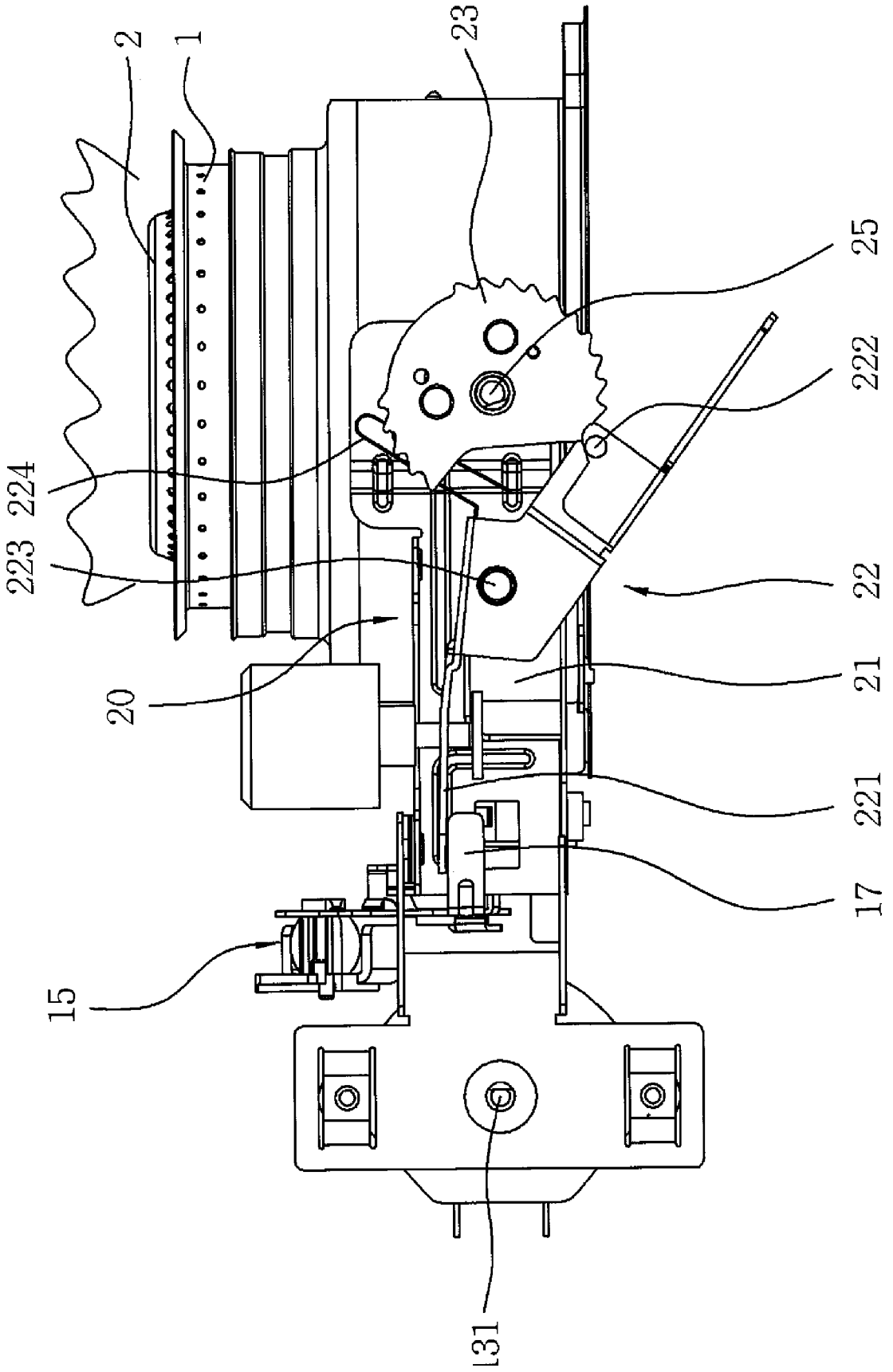
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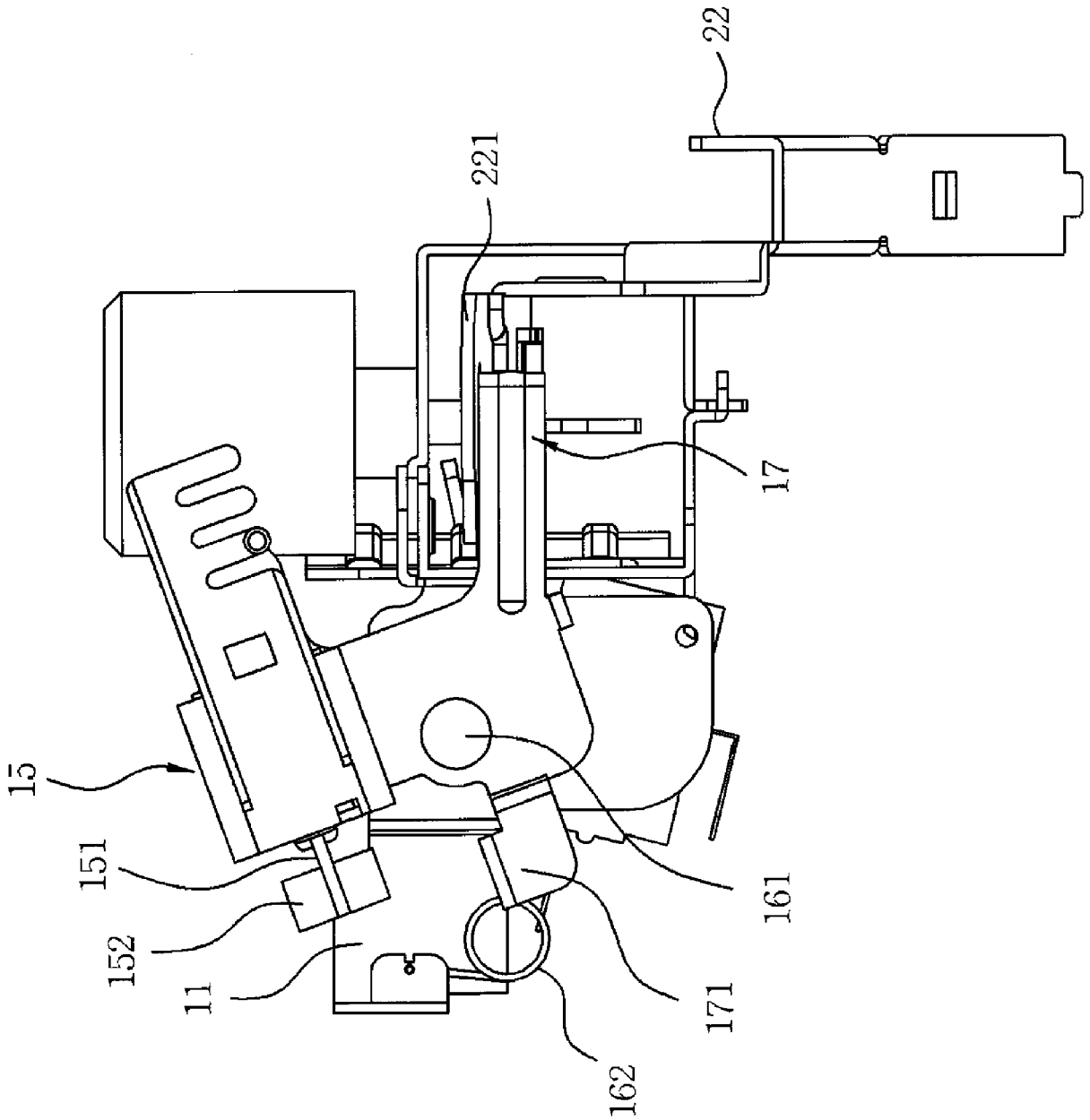
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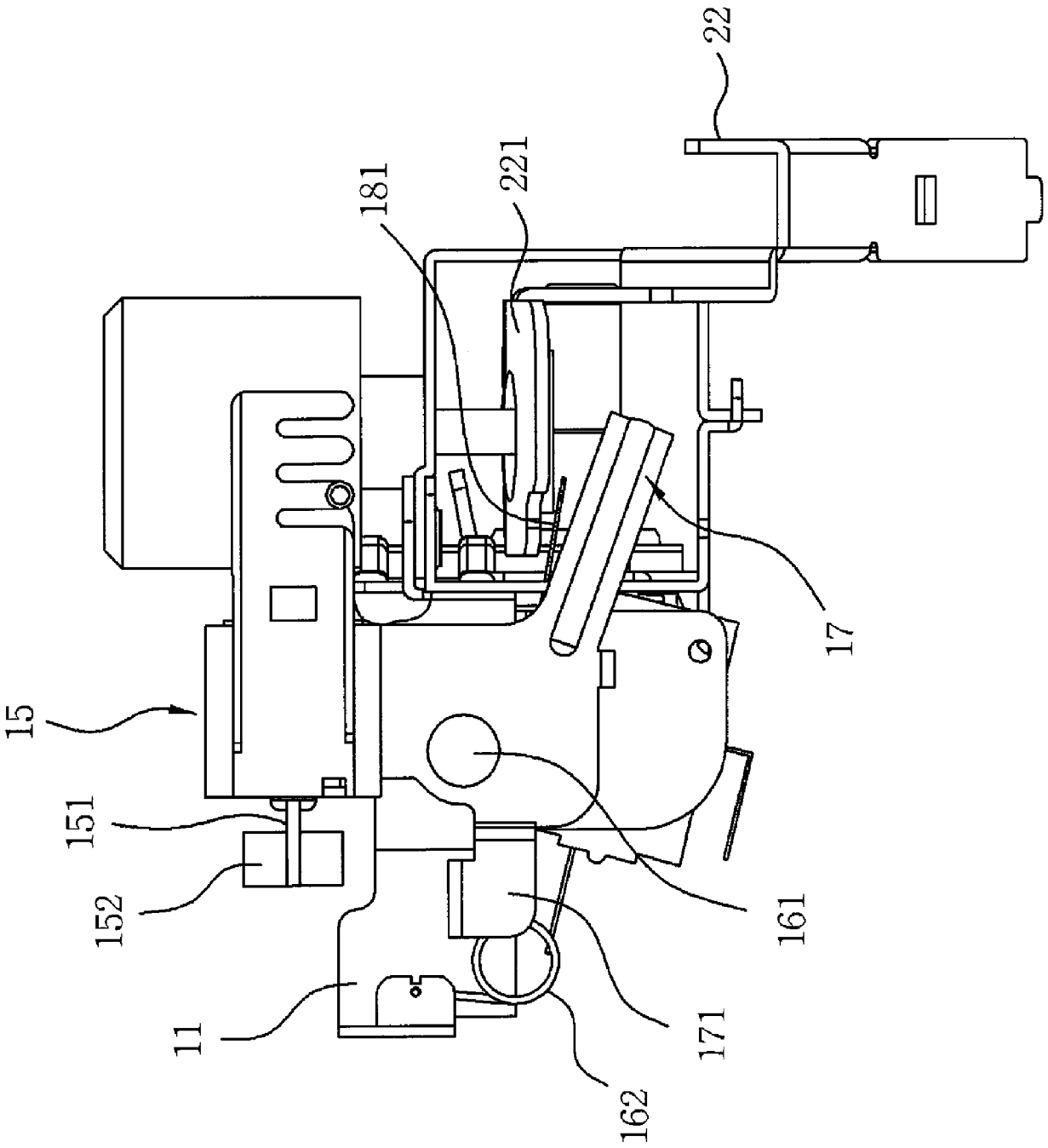
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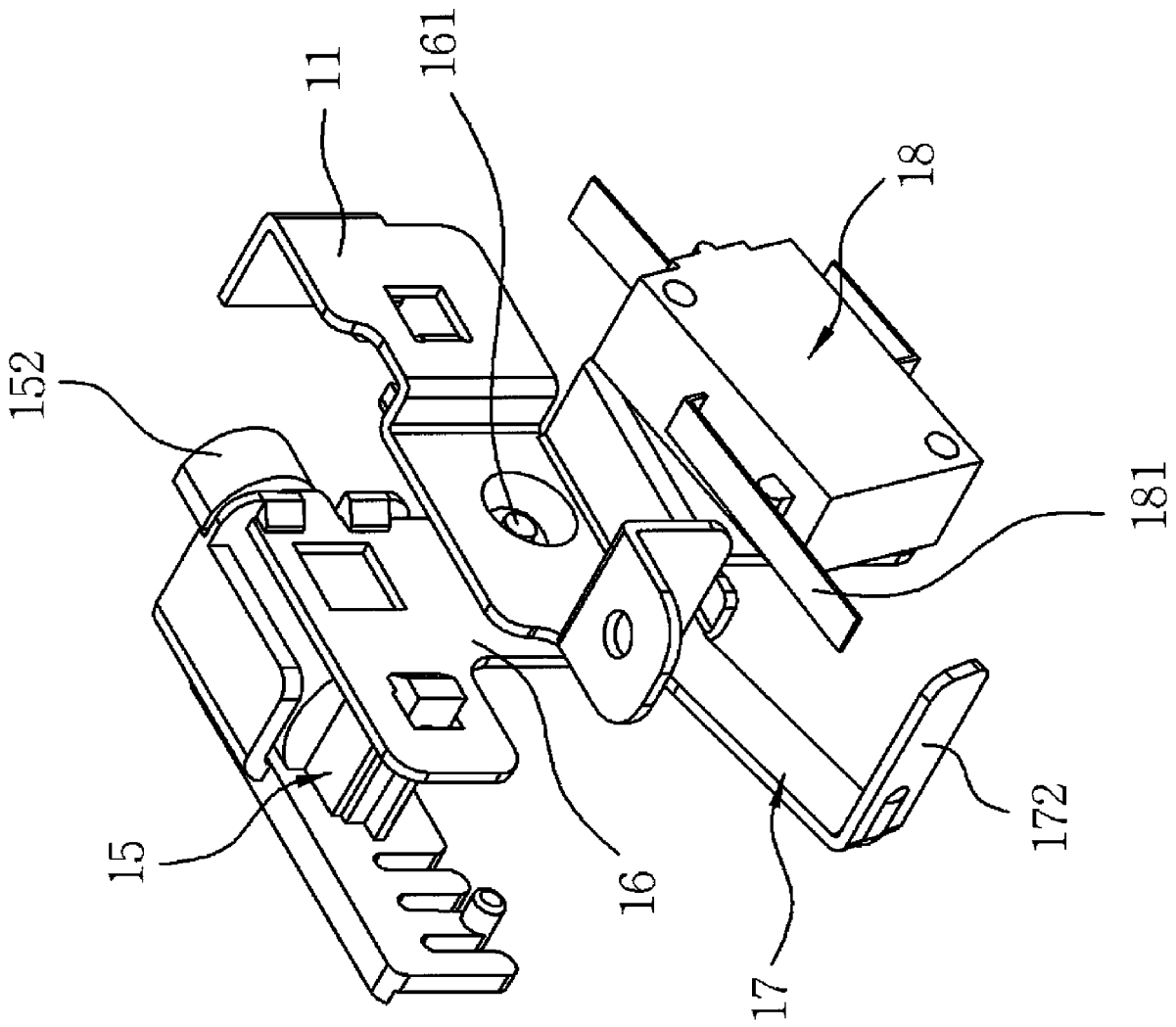
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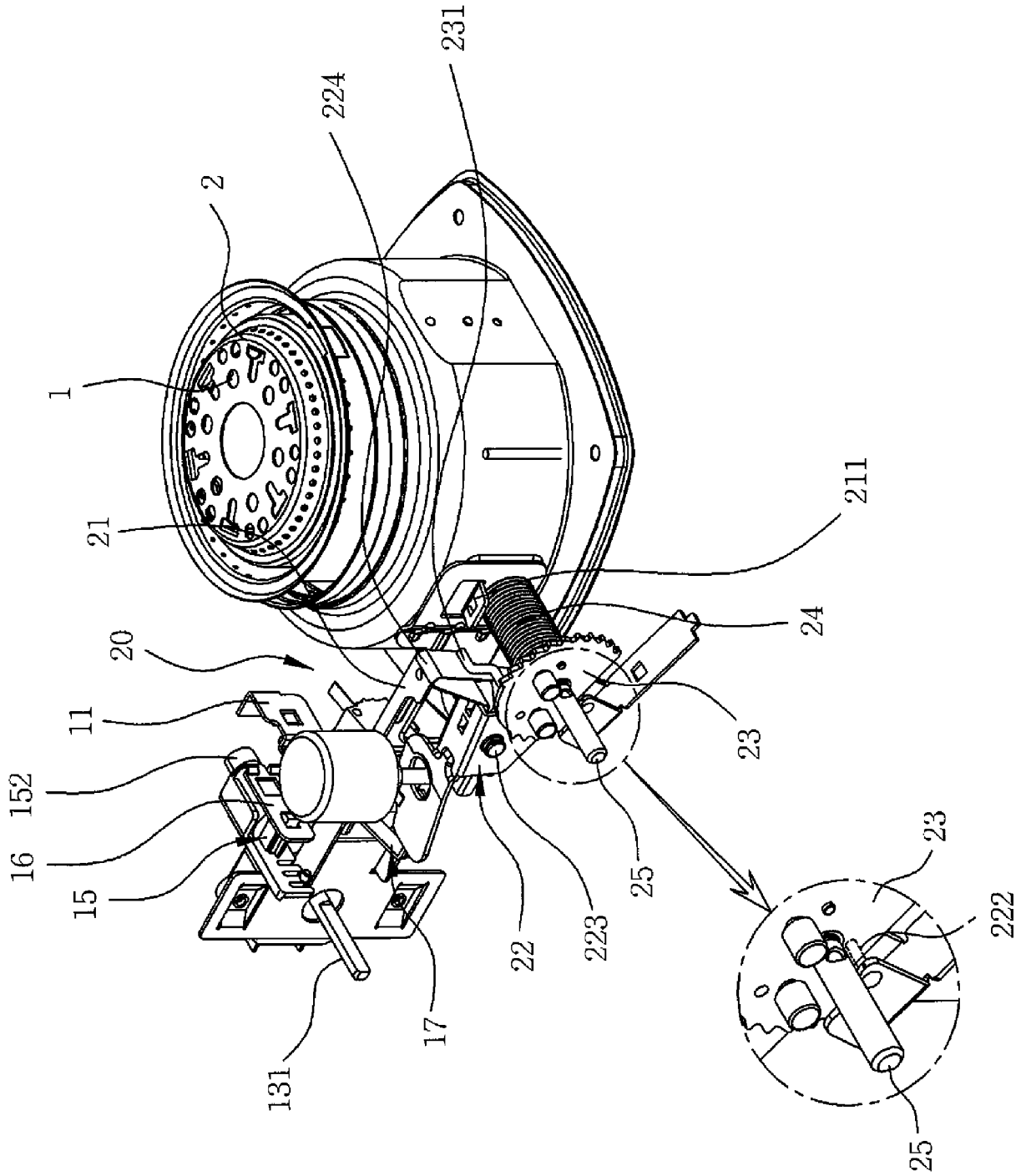
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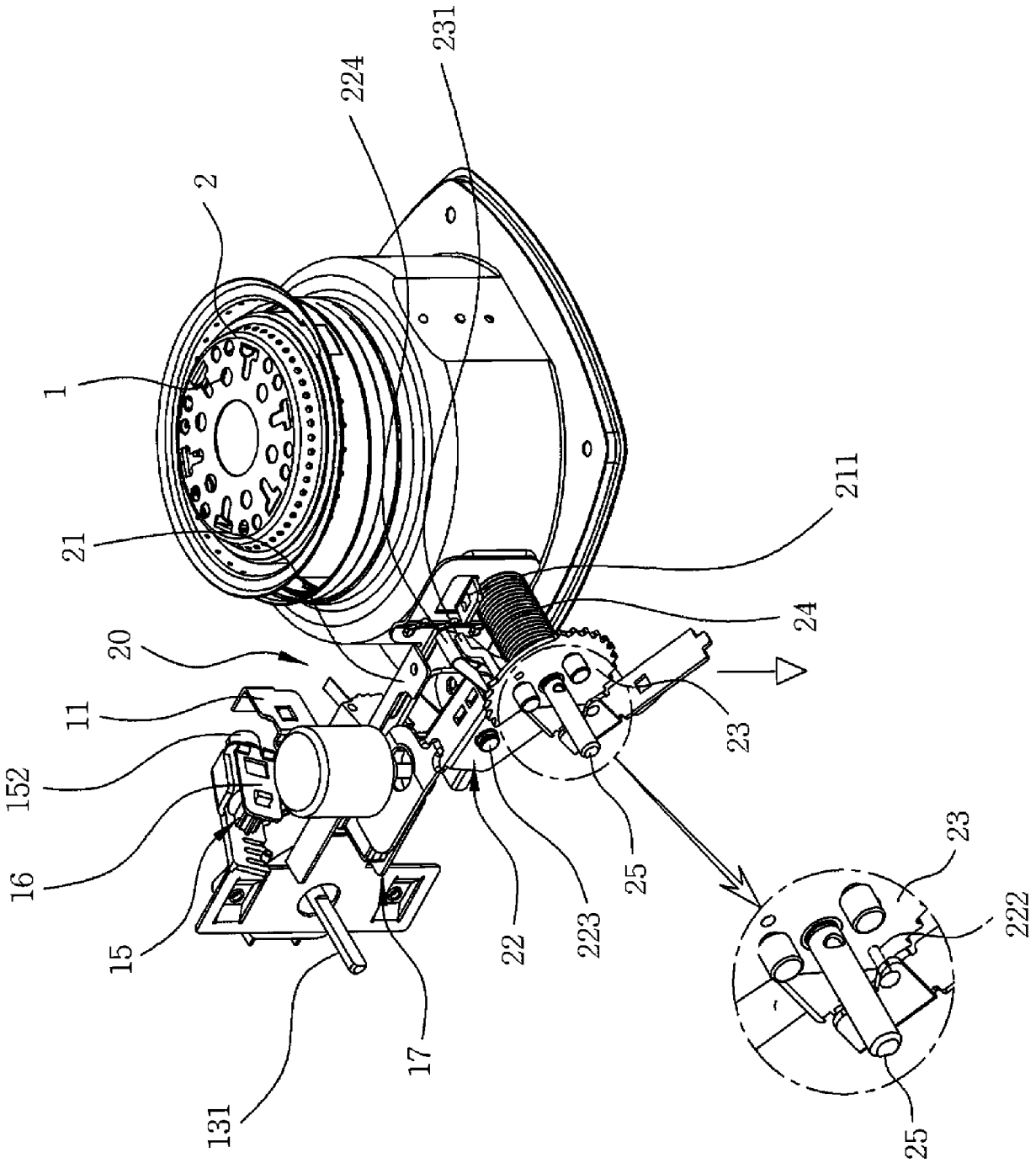
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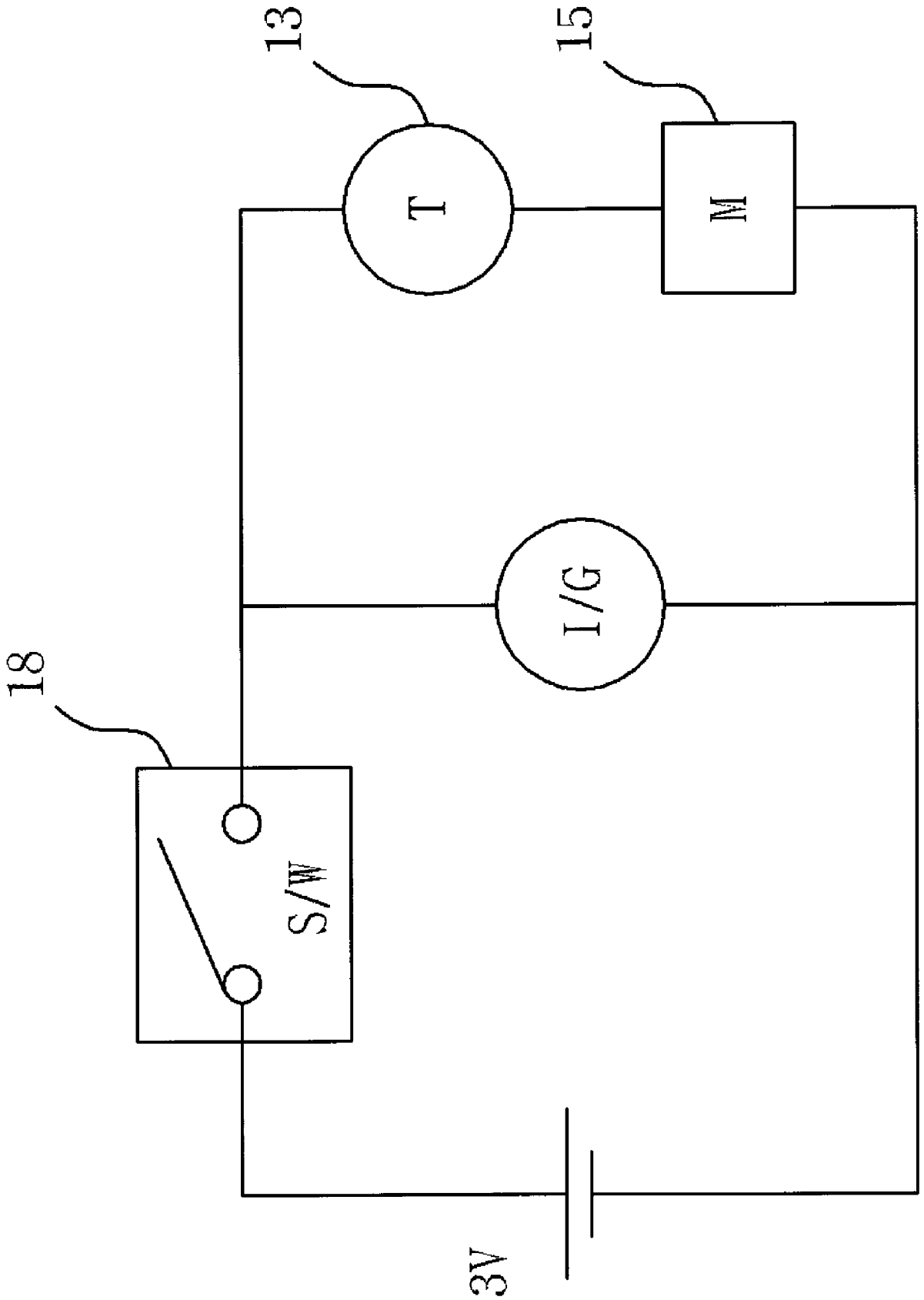
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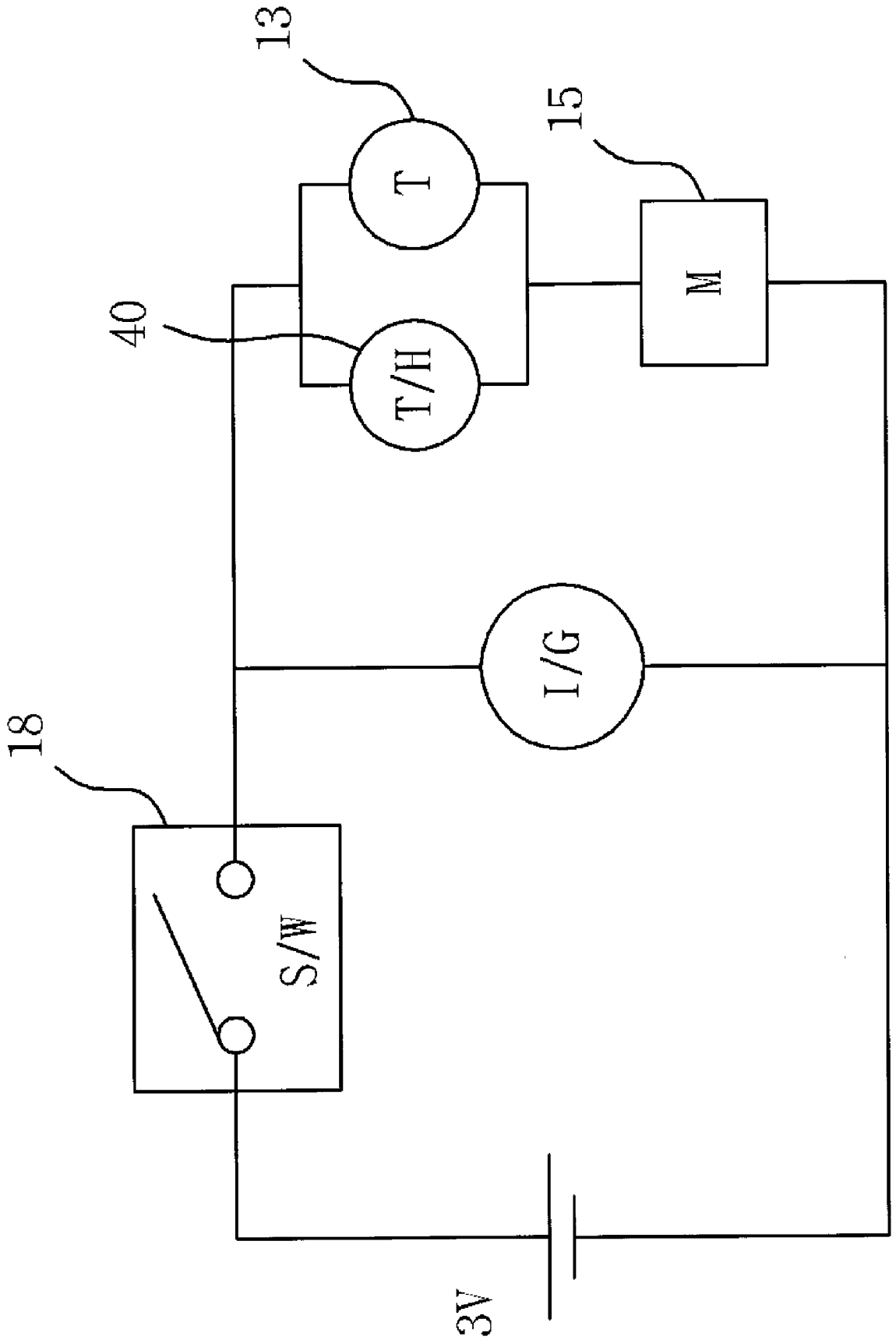
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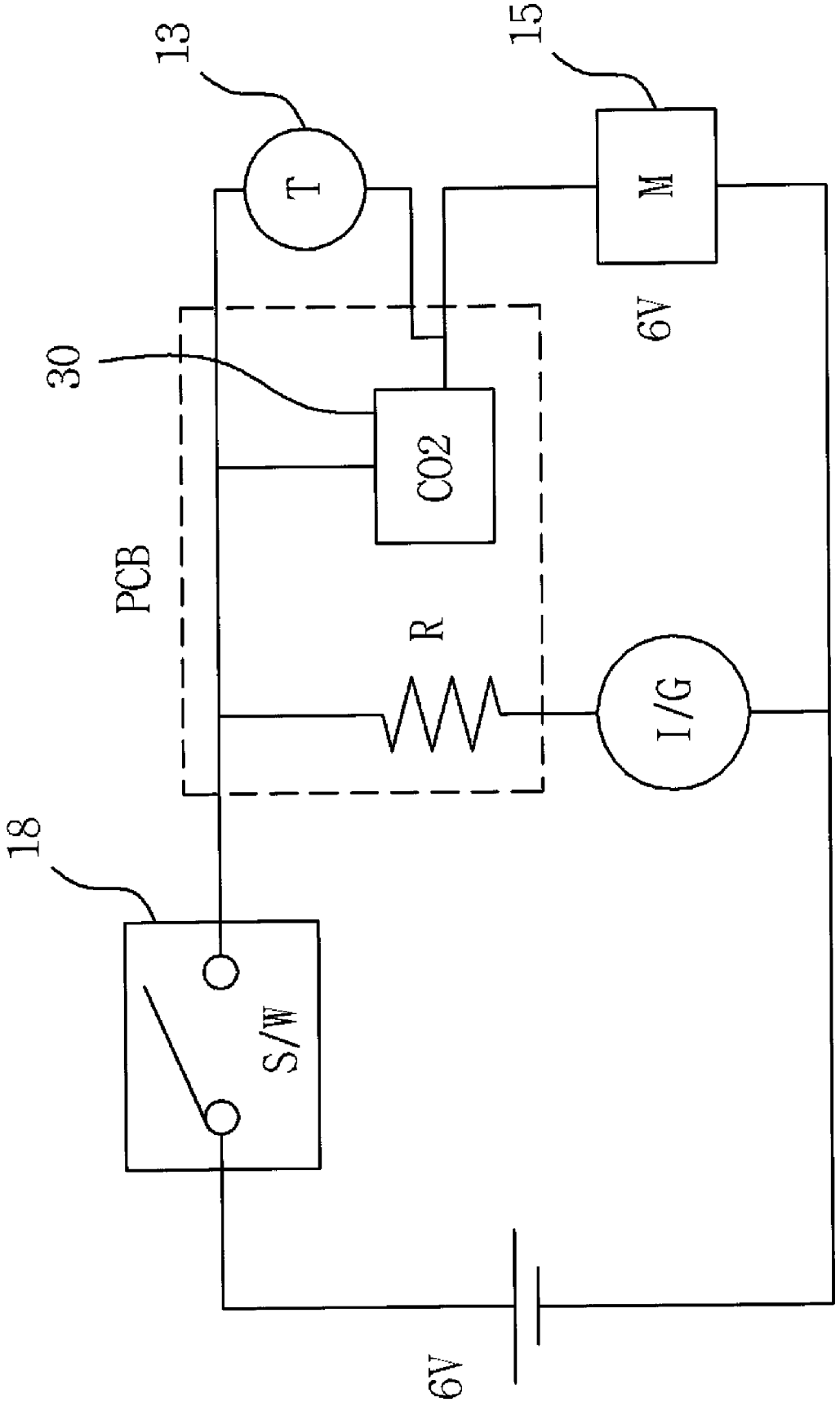
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 0982803 **[0005]**