(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 969 251 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.01.2000 Bulletin 2000/01

(51) Int Cl.[7]: **F23Q 3/00**

(21) Application number: **99305190.3**

(22) Date of filing: **01.07.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **01.07.1998 KR 9811670**

(71) Applicant: **DAEWOO ELECTRONICS CO., LTD**
Seoul (KR)

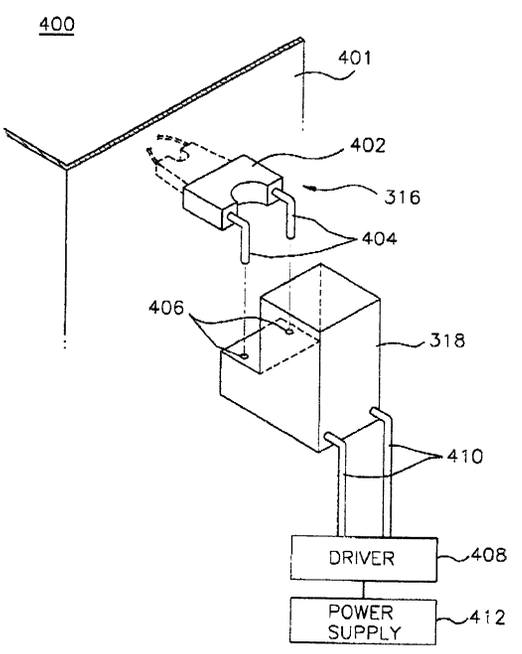
(72) Inventor: **Min, Choon-Hee**
Namdong-Ku, Incheon (KR)

(74) Representative:
Cross, Rupert Edward Blount et al
BOULT WADE TENNANT,
27 Furnival Street
London EC4A 1PQ (GB)

(54) Ignition apparatus for boiler

(57) An ignition apparatus for a boiler capable of preventing a wrong operation of a control circuit is provided. In the ignition apparatus for a boiler, a sparking plug performs an igniting operation of the gas supplied into the burner. Spark plug has an insulator mounted to a back wall of the combustion chamber and two leads extending from both ends of the insulator. A high voltage transformer generates a high voltage necessary to ignite the burner and applies the high voltage to the spark plug. Two connecting terminals are formed at one end of high voltage transformer. Two leads are inserted into two connecting terminals. A driver is mounted to the control circuit in such a way that the driver is connected to the spark plug and drives the spark plug. A wire connects the high voltage transformer and the driver. A power supply is mounted to a control circuit in such a way that the power supply is electrically connected to the driver and supplies power to the driver in order to control an operation of the driver. According to the ignition apparatus, discharge noise of a high voltage generated in a high voltage cable according to the conventional ignition apparatus does not affect the control circuit to thereby prevent a wrong operation of the control circuit.

FIG.4



EP 0 969 251 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an ignition apparatus, more particularly, to an ignition apparatus which ignites a gas generated by a burner in a boiler.

2. Prior Art

[0002] The efficient control of combustion relates to the efficient control of the fuel and combustion oxidant, usually air. Efficient control of combustion is essential in the power industry, chemical industry, and various other process industries. The control of combustion can be used in not only the industrial application, but also boilers at apartments or houses. In general, boilers are classified as a gas boiler or an oil boiler according to the fuel to being used. Especially, because the gas boiler uses gas as the fuel, it does not generate waste gas which would contaminate the environment in comparison with the oil boiler. Further, the gas boiler is easy to manage. Accordingly, it has been widely used in many houses or apartments.

[0003] The gas boiler uses a liquefied petroleum gas (LPG) or a liquefied natural gas(LNG), and heats water with high temperature heat generated by the fuel combustion in the burner. The heated water with high temperature is circulated through pipes installed in the room, and then heats the space of the room. Also, the boiler may supply warm water to a kitchen or bathroom.

[0004] U.S. Patent No. 4,863,372 (issued to Don A. Berlincourt on September 5, 1989) discloses a gas ignition apparatus for igniting gas flowing from a burner and more particularly to an apparatus which ensures that a heat-type ignition device has reached ignition temperature before gas is allowed to flow from the burner.

[0005] FIG. 1 shows a configuration of a conventional gas boiler. As shown in FIG. 1, a combustion chamber 102 is formed at an inner side of a housing 104 and heats heating water by using combustion heat of a gas. A burner 106 is mounted to a lower portion of the combustion chamber 102 and performs a combustion operation of incoming gas. A heat exchanger 108 is mounted to an upper portion of the burner 106 and applies heat to the heating water by using combustion heat generated by the burner 106.

[0006] An air inlet 110 is formed at an upper back portion of the body 104 and air necessary to burn a gas is introduced through the air inlet 110. The air introduced through the air inlet 110 is supplied into the combustion chamber 102 by means of a fan 114. An air outlet 112 is formed at an upper center portion of the body 104 and an exhaust gas within the combustion chamber 102 is discharged through the air outlet 112. A control circuit 115 is mounted at a lower front portion of the housing 104.

[0007] An ignition transformer 116 is mounted to one end of the control circuit 115 and generates a high voltage necessary to ignite the burner 106. The high voltage generated by the ignition transformer 116 is supplied to a spark plug 118.

[0008] FIG. 2 is a circuitry diagram for showing a configuration of the ignition apparatus 200 shown in FIG. 1. The ignition apparatus 200 includes an ignition transformer 116, a spark plug 118, a power supply 202, and a high voltage cable 204. The ignition transformer 116 includes a high voltage transformer 206 and a driver 208. The high voltage transformer 206 generates high voltage. The driver 208 drives the high voltage transformer 206. The spark plug 118 operates in response to the high voltage from the ignition transformer 116 and ignites the gas which is supplied to the burner 106. The power supply 202 supplies a power to the sparking plug 118. The high voltage cable 204 is installed between the spark plug 118 and the ignition transformer 116 and connects the spark plug 118 to the ignition transformer 116.

[0009] A gas supply pipe 120 supplies external gas into the burner 106. A gas valve 122 is mounted at one end of the gas supply pipe 120 and controls the supply of gas into the burner 106. The heating water which is heated in the heat exchanger 108 is fed into a hot water heat exchanger 124. Cold water, which goes through a cold water feeding tube 129, is heated in the hot water heat exchanger 124.

[0010] The heating water and cold water fed to the hot water heat exchanger 124 are supplied into a warm water tube(not shown) through a heating-water feeding tube 128 or exchange heat with each other by driving a circulating pump 126 and are fed to a kitchen or a bathroom through a hot-water feeding tube 131. The heating water is returned to a water tank 130.

[0011] When the conventional gas boiler is operated, the fan 114 rotates at high speed to ventilate the inside of the combustion chamber 102 and then rotates at low speed. At this time, the gas valve 122 is opened and external gas is supplied to the burner 106. The supplied gas is ignited by a high voltage discharge of the spark plug 118. Accordingly, the heating water or the hot water which is heated or exchange-heated by the combustion heat is fed to the kitchen or the bathroom through the warm water tube.

[0012] However, in the conventional ignition apparatus, since the ignition transformer 116 is mounted at one side of the control circuit 115 and the high voltage cable 204 is mounted between the ignition transformer 116 and the spark plug 118, discharge noise of a high voltage generated by the ignition transformer 116 and the high voltage cable 204 affects a main printed circuit board which is mounted at the control circuit 130 to thereby generate a wrong operation of the control circuit 130. Furthermore, since the ignition transformer 116 and the spark plug 16 are mounted at different positions,

an expensive high voltage cable 161 should be connected between the ignition transformer 116 and the spark plug 118. Therefore, manufacturing cost is increased.

SUMMARY OF THE INVENTION

[0013] Therefore, it is an object of the present invention, for the purpose of solving the above mentioned problems, to provide an ignition apparatus for a boiler capable of preventing a wrong operation of a control circuit.

[0014] In order to attain the object, according to the present invention, there is provided an ignition apparatus for a boiler, the boiler having a burner for performing a combustion operation of an incoming gas, and a control circuit for controlling all functions of the boiler, said apparatus comprising:

a spark plug for performing an igniting operation of the gas supplied into the burner, the spark plug having an insulator mounted to a back wall of the combustion chamber and two leads extending outwardly from both ends of the insulator;

a high voltage transformer for generating a high voltage necessary to ignite the burner and applying the high voltage to the spark plug, two connecting terminals being formed at one end of the high voltage transformer, the two leads being inserted into the two connecting terminals;

a driver mounted to the control circuit in such a way that the driver is connected to the sparking plug for driving the sparking plug;

a wire connected between the high voltage transformer and the driver for connecting the high voltage transformer and the driver; and

a power supply mounted to the control circuit in such a way that the power supply is electrically connected to the driver for supplying power to the driver in order to control an operation of the driver.

[0015] According to the ignition apparatus, discharge noise of a high voltage generated in a high voltage cable according to the conventional ignition apparatus does not affect the control circuit to thereby prevent a wrong operation of the control circuit.

[0016] Other objects and further features of the present invention will become apparent from the detailed description when read in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Other features and advantages of the present invention will become more apparent from the following description taken in connection with the accompanying drawings, wherein:

FIG. 1 is a schematic illustration for showing a configuration of a conventional gas boiler;

FIG. 2 is a circuitry diagram for showing a configuration of the ignition apparatus shown in FIG. 1;

FIG. 3 is a schematic illustration for showing a configuration of a gas boiler according to an embodiment of the present invention;

FIG. 4 is an enlarged detail of the ignition apparatus depicted in shown in FIG. 3; and

FIG. 5 is a circuitry diagram for showing a configuration of the ignition apparatus shown in FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] The preferred embodiment of the present invention will hereinafter be described in detail with reference to the accompanying drawings.

[0019] FIG. 3 schematically shows a configuration of a boiler according to an embodiment of the present invention.

[0020] A combustion chamber 302 is formed at an inner side of a housing 304 and heats heating water by using combustion heat of a gas. A burner 306 is mounted to a lower portion of the combustion chamber 302 and performs a combustion operation of incoming gas. A heat exchanger 308 is mounted to an upper portion of the burner 306 and applies heat to the heating water by using combustion heat generated by the burner 306.

[0021] An air inlet 310 is formed at an upper back portion of the housing 304 and air necessary to burn the gas is introduced through the air inlet 310. The air introduced through the air inlet 310 is supplied into the combustion chamber 302 by means of a fan 314. An air outlet 312 is formed at an upper center portion of the housing 304 and exhaust gas within the combustion chamber 302 is discharged through the air outlet 312. A control circuit 315 is mounted at a lower front portion of the housing 304.

[0022] FIG. 4 is an enlarged detail of the ignition apparatus shown in FIG. 3. FIG. 5 is a circuitry diagram for showing a configuration of the ignition apparatus shown in FIG. 4.

[0023] The spark plug 316 performs an igniting operation of the gas supplied into the burner 306. The spark plug 316 includes an insulator 402 and two leads 404. The insulator 402 is mounted to a back wall 401 of the combustion chamber 302. Two leads 404 extend outwardly from both ends of the insulator 402. Center portions of the two leads 404 are vertically curved.

[0024] The high voltage transformer 318 generates high voltage necessary to ignite the burner 306 and applies the generated high voltage to the spark plug 316. Two connecting terminals 406 are formed at one end of the high voltage transformer 318. The two leads 404 of the sparking plug 316 are inserted into the two connecting terminals 406 of the high voltage transformer 318.

[0025] The driver 408 is mounted to the control circuit 315 and is connected to the spark plug 316. The driver

408 drives the spark plug 316.

[0026] The wire 410 is connected between the high voltage transformer 318 and the driver 408 and connects the high voltage transformer to the driver 408.

[0027] The power supply 410 is mounted to the control circuit 315 in such a way that the power supply 410 is electrically connected to the driver 408. The power supply 410 applies a power to the driver 408 in order to control an operation of the driver 408.

[0028] A gas supply pipe 320 supplies external gas into the burner 306. A gas valve 322 is mounted at one end of the gas supply pipe 320 and controls the supply of gas into the burner 306. The heating water which is heated in the heat exchanger 308 is fed into a hot water heat exchanger 324. Cold water, which goes through a cold water feeding tube 329, is heated in the hot water heat exchanger 324.

[0029] The heating water and cold water fed to the hot water heat exchanger 324 are supplied into a warm water tube(not shown) through a heating-water feeding tube 328 or exchange heat with each other by driving a circulating pump 326 and are fed to a kitchen or a bathroom through a hot-water feeding tube 331. The heating water is returned to a water tank 330.

[0030] Hereinafter, an operation of the gas boiler according to an embodiment of the present invention will be described referring to the accompanying drawings.

[0031] When the gas boiler is operated, the fan 314 rotates at high speed to ventilate the inside of the combustion chamber 302 and then rotates at low speed. At this time, the gas valve 322 is opened and external gas is supplied to the burner 306.

[0032] The burner 306 performs a combustion operation of the supplied gas. The driver 408 drives the spark plug 316. The high voltage transformer 318 generates high voltage necessary to ignite the burner 306 and applies the generated high voltage to the spark plug 316.

[0033] The spark plug 316 operates under the control of the driver 408, receives the high voltage from the high voltage transformer 318, and performs an igniting operation of the gas supplied into the burner 306. Accordingly, the heating water or the hot water which is heated or exchange-heated by the combustion heat is fed to the kitchen or the bathroom through the warm water tube.

[0034] As mentioned above, according to the present invention, the high voltage transformer 318 is directly connected to a back portion of the spark plug 316, so discharge noise of a high voltage generated in a high voltage cable according to the conventional ignition apparatus does not affect the control circuit 315 to thereby prevent a wrong operation of the control circuit 315. Also, a general wire is used for a connecting wire for connecting the high voltage transformer 318 to the control circuit 315. Therefore, the waste of a cost generated by the mounting of the high expensive voltage cable can be prevented.

[0035] The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. An ignition apparatus for a boiler, the boiler having a burner for performing a combustion operation of an incoming gas, and a control circuit for controlling all functions of the boiler, said apparatus comprising:

   a spark plug for performing an igniting operation of the gas supplied into the burner, the spark plug having an insulator mounted to a back wall of the combustion chamber and two leads extending outwardly from both ends of the insulator;
   a high voltage transformer for generating a high voltage necessary to ignite the burner and applying the high voltage to the spark plug, two connecting terminals being formed at one end of the high voltage transformer, the two leads being inserted into the two connecting terminals;
   a driver mounted to the control circuit in such a way that the driver is connected to the sparking plug for driving the sparking plug;
   a wire connected between the high voltage transformer and the driver for connecting the high voltage transformer and the driver; and
   a power supply mounted to the control circuit in such a way that the power supply is electrically connected to the driver for supplying power to the driver in order to control an operation of the driver.

2. The apparatus as defined in claim 1, wherein center portions of the two leads are vertically curved.

FIG. 1

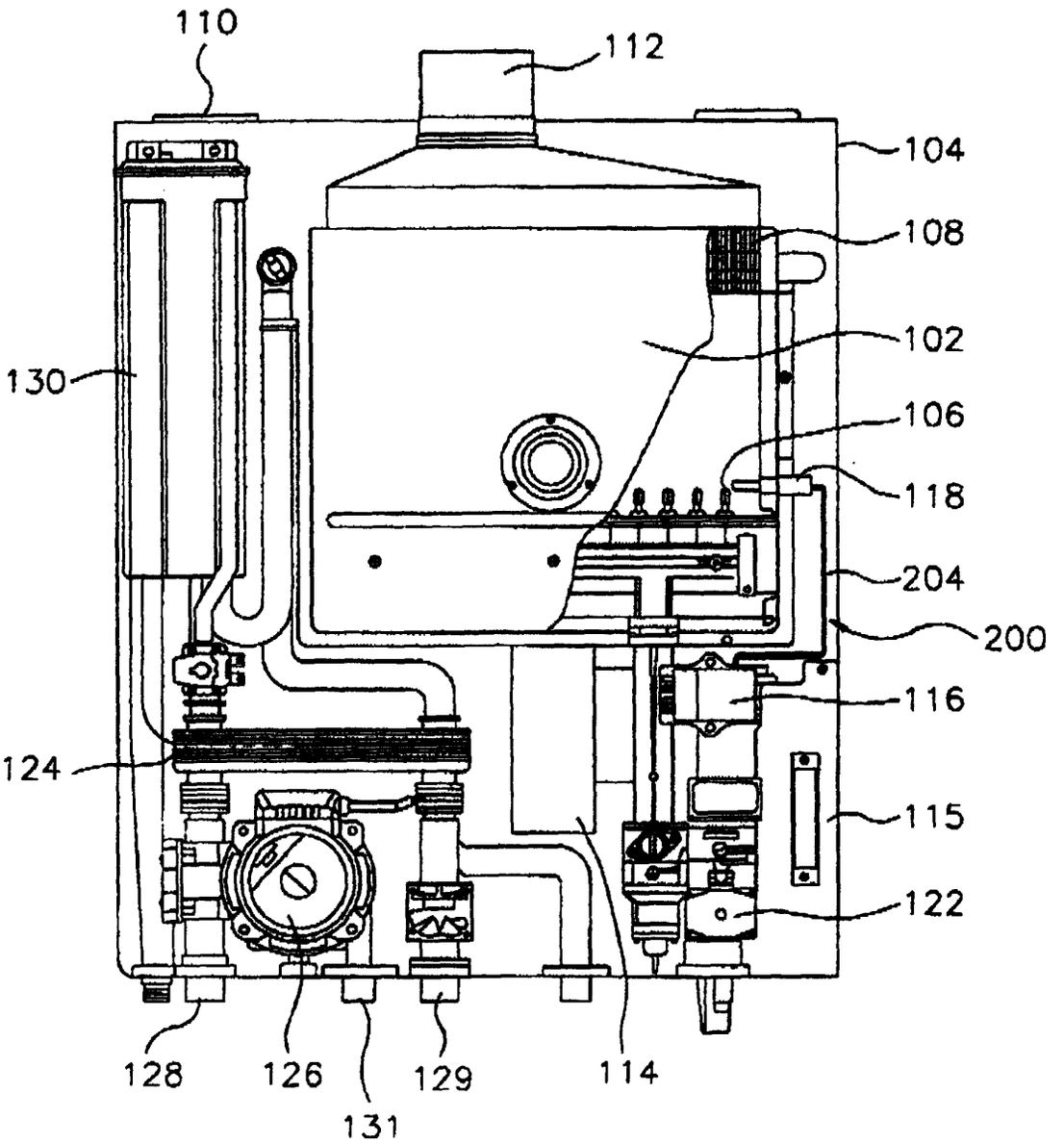

110
112
104
108
102
130
106
118
204
200
116
124
115
122
128
126
131
129
114

FIG.2

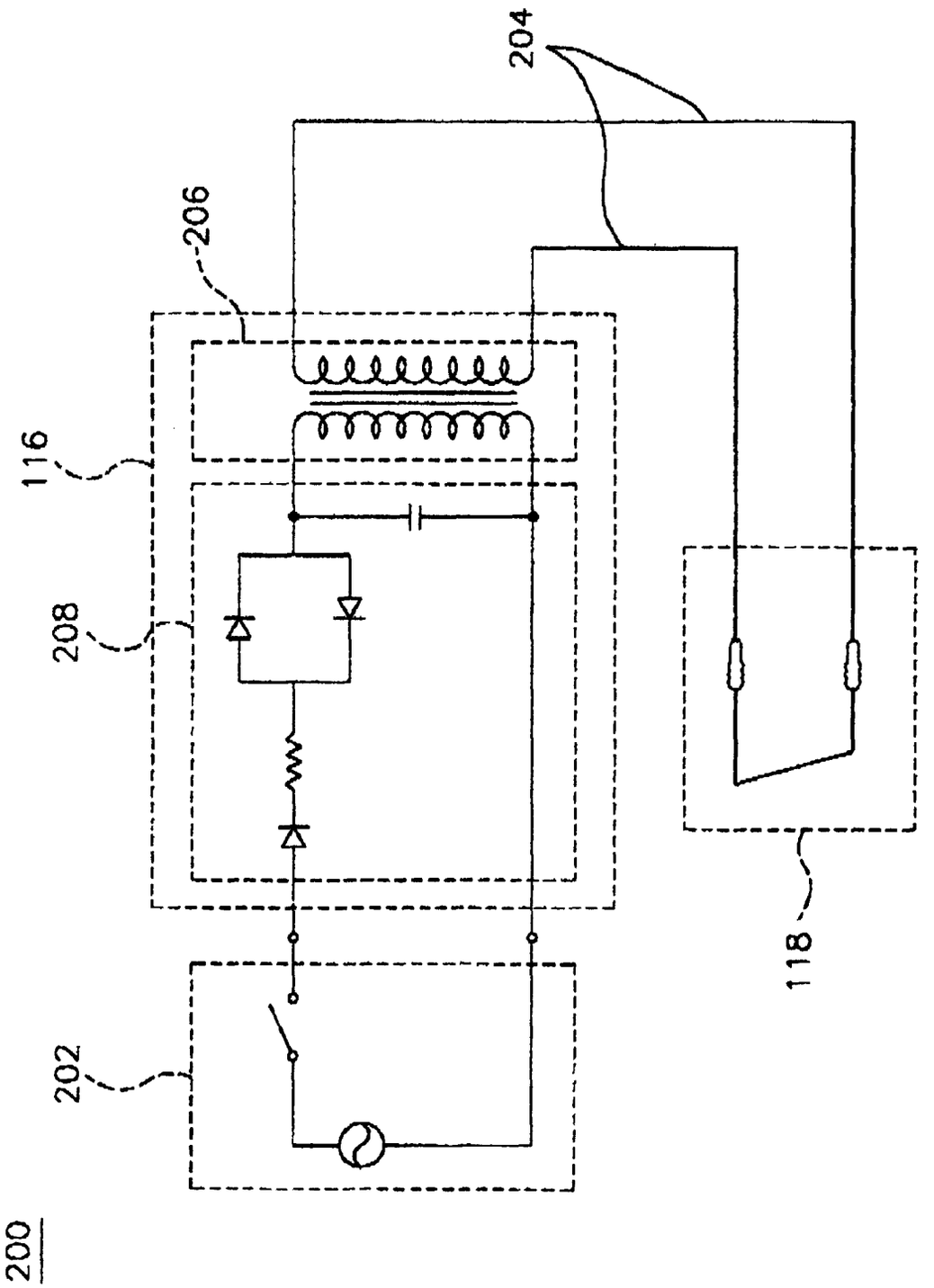


FIG.3

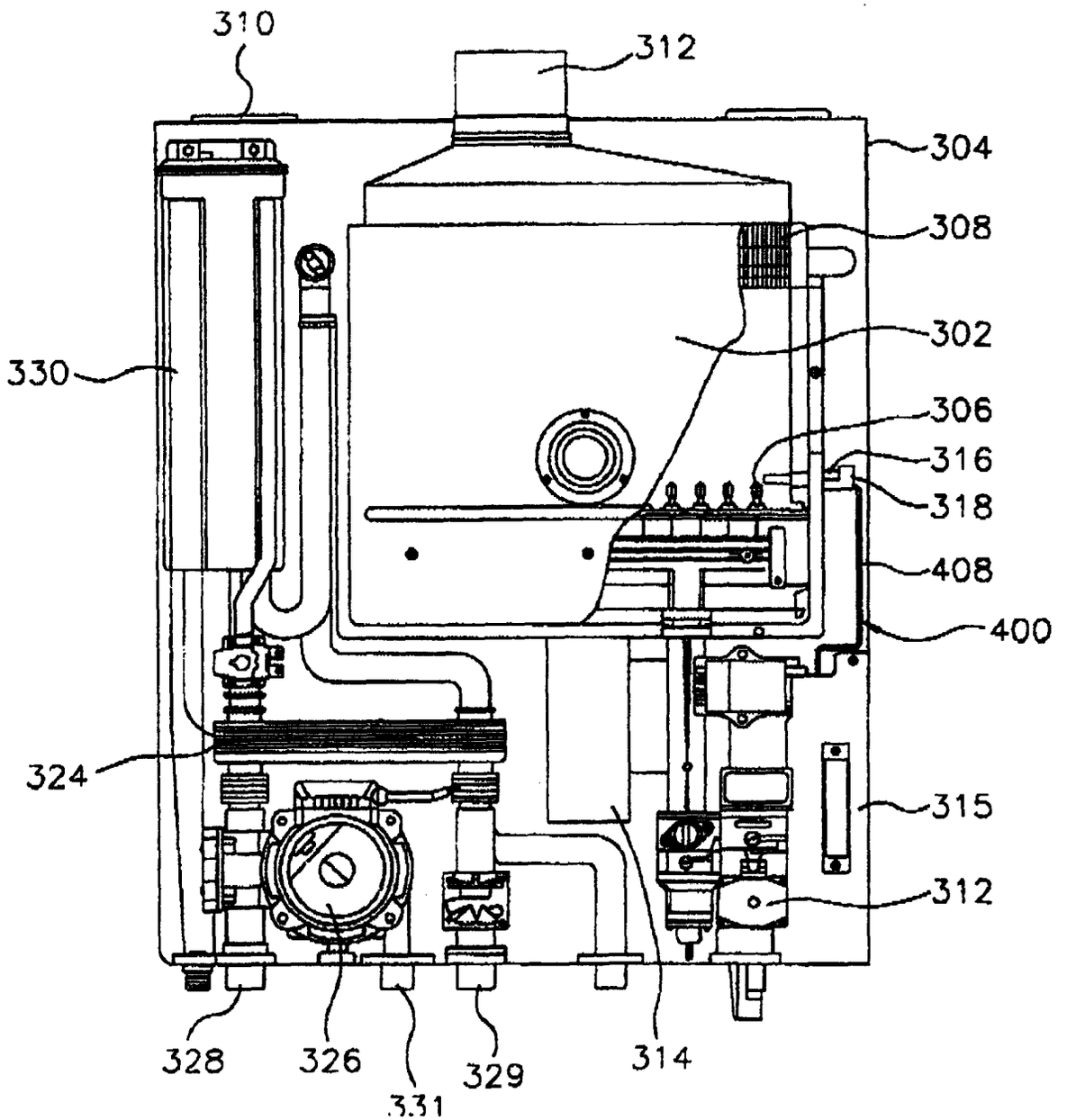

310
312
304
308
302
330
306
316
318
408
400
324
315
312
328
326
331
329
314

FIG.4

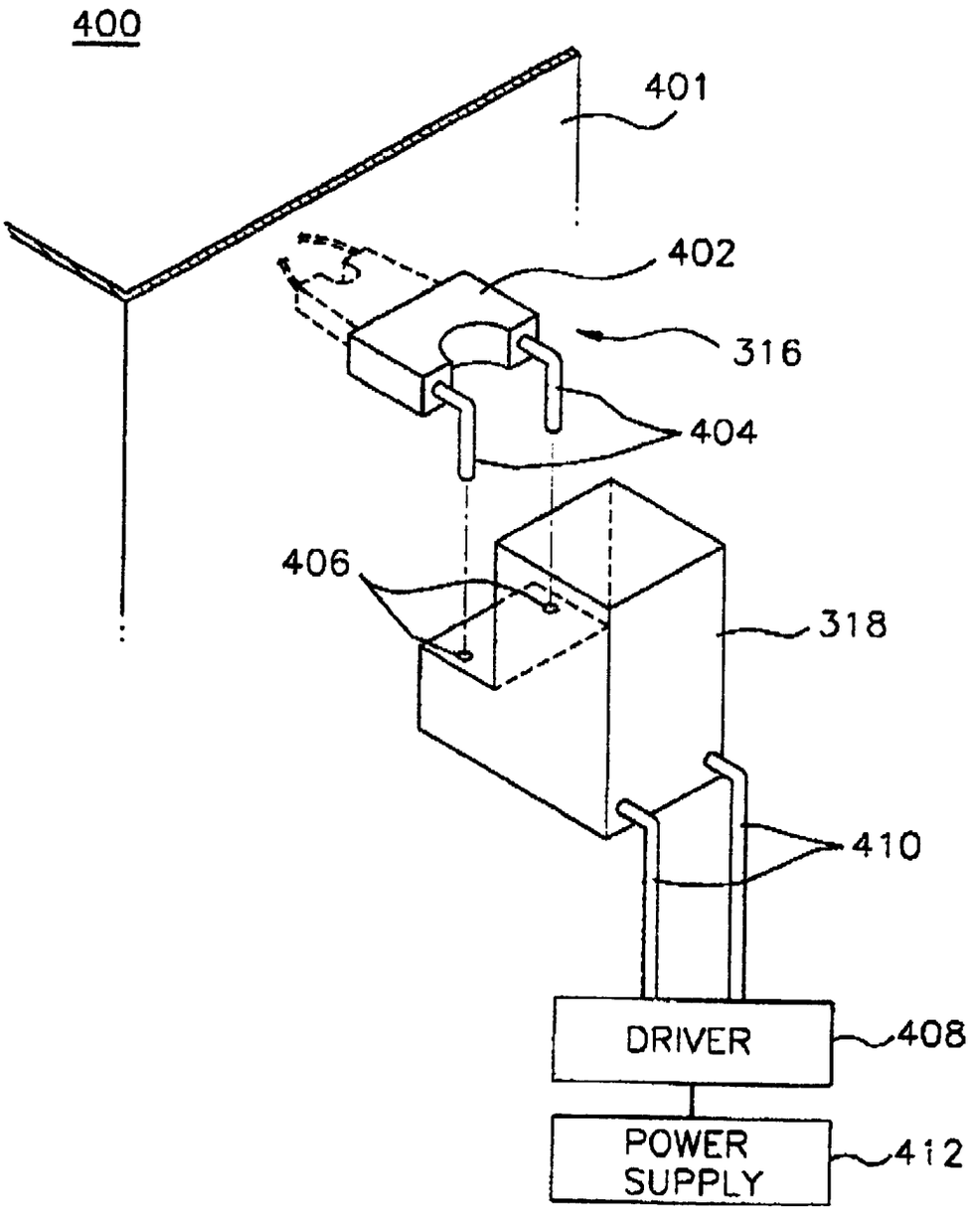


FIG.5