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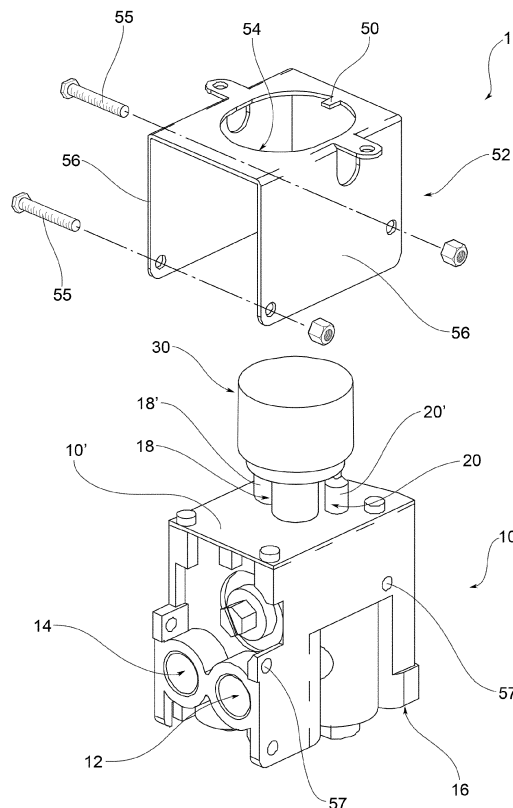
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(54) **THERMOSTATIC VALVE FOR GAS STOVES**

(57) The invention relates to a thermostatic valve for controlling a gas stove, comprising an adjustment knob (30) rotatable between a completely off position, wherein the valve closes the passage of gas both to a main burner and to a pilot burner, a stand-by position, wherein the valve closes the passage of gas only to the main burner,

and an adjustment position, wherein the valve allows the passage of gas both to the main burner and to the pilot burner. The thermostatic valve comprises a stop member (50) adapted to prevent a rotation of the adjustment knob from the stand-by position to the completely off position.



**FIG.1**

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## Description

### Scope

**[0001]** The object of the present invention is a thermostatic valve for controlling gas stoves, and a gas stove provided with such a thermostatic valve. In particular, the thermostatic valve according to the invention may be used in gas stoves for domestic heating that cannot be connected to a flue gas exhaust duct, for example portable or mobile gas stoves.

### Prior Art

**[0002]** Gas stoves, and among these stoves for domestic use for the heating of interiors that cannot be connected to a flue exhaust duct for which the present invention is particularly intended, generally comprise a tank containing pressurized gas, a tank cock positioned at the outlet of the gas tank to open/close the gas supply duct, a pressure regulator that reduces the gas pressure to a value generally between 28 and 50 mbar (depending on the intended country of use), a thermostatic valve that receives the gas from the pressure regulator and distributes it to a pilot burner and, by adjusting its flow according to the pre-set temperature, towards at least one main burner.

**[0003]** The pilot burner, which generates the so-called "pilot flame", heats a thermocouple which generates an electric current sufficient to supply an electromagnet, which in turn controls the thermostatic valve. In the presence of an excessive level of carbon dioxide in the environment, and therefore a lack of oxygen, the pilot flame goes out, deactivating the electromagnet and therefore inhibiting the delivery of the gas by the thermostatic valve.

**[0004]** A recent regulation (UNI EN 449) which regulates the use of domestic heating appliances that cannot be connected to a flue gas exhaust duct requires that the stove cannot be switched off completely other than by closing the tank cock. Therefore, the thermostatic valve may interrupt the supply of gas to the main burner, but the pilot burner, and therefore the pilot flame, may never be switched off if the tank cock is not closed upstream of the thermostatic valve.

**[0005]** Therefore, thermostats have been proposed that allow compliance with such safety regulation, i.e. the pilot burner is always left lit. However, such thermostats have not proven to be efficient and economical since, in order to keep the pilot burner lit, a quantity of gas is also passed to the main burner. In practice, the main burner is modulated but it is never switched off completely.

**[0006]** On the other hand, thermostatic valves for stoves, convectors, water heaters, boilers and other appliances that require temperature control are known, but they are used in applications that do not have to comply with the safety standard mentioned above, for example, because they are in communication with the external environment. Such thermostatic valves are very efficient as

they allow the main burner to be switched off completely. However, these valves also allow the pilot burner to be switched off manually when the appliance is not in use and for this reason they cannot be used in stoves that must comply with the aforementioned UNI EN 449 standard.

### Presentation of the invention

**[0007]** The object of the present invention is therefore to propose a thermostatic valve for gas stoves which must comply with the safety regulation cited above and which at the same time is able to eliminate the drawbacks of the prior art.

**[0008]** A further object of the present invention is to make an existing thermostatic valve compliant with the UNI EN 449 standard, used in applications that allow the pilot burner to be switched off.

### Brief description of the drawings

**[0009]** The technical features of the invention, according to the above objects, are clearly apparent from the content of the claims below and the advantages thereof will become more apparent in the following detailed description, made with reference to the accompanying drawings, which represent one or more purely exemplifying and non-limiting embodiments, wherein:

- figure 1 is an exploded perspective view of the thermostatic valve according to the invention;
- figures 2, 2a, 2b and 2c are likewise views of the assembled thermostatic valve;
- figures 3, 3a and 3b are enlarged views of the assembled valve on the retention bracket, in a stand-by position, in an adjustment position, and in a position close to the stand-by position;
- figure 4 is an exploded perspective view of a gas stove equipped with the thermostatic valve according to the invention; and
- figures 5, 5a and 5b are two side views and a plan view from above of the assembled stove (without protective casing).

### Detailed description

**[0010]** With reference to the accompanying drawings, a thermostatic valve for controlling the temperature of a gas stove according to the present invention is indicated collectively at reference number 1.

**[0011]** A gas stove according to an embodiment illustrated in the drawings, including the thermostatic valve 1, is indicated at 100.

**[0012]** The thermostatic valve 1 comprises a valve body 10 wherein at least one gas inlet duct 12 is connectable to an inlet pipe 120 coming from a tank 102, at least one first gas outlet duct 14 connectable to a first outlet pipe 140 directed to a main burner 104 of the stove

100, and a second gas outlet duct 16 connectable to a second outlet duct 160 directed to a pilot burner 106.

**[0013]** In the valve body 10 is housed at least one first interception element 18 suitable to regulate the passage of gas from the inlet duct 12 to the first outlet duct 14 and a second interception element 20 suitable to regulate the passage of gas from the inlet duct 12 to second outlet duct 16.

**[0014]** For example, the first interception element 18 is movable between two end positions, with maximum opening and complete closure of a through-lumen of the gas between the inlet duct 12 and the first outlet duct 14, passing between a plurality of intermediate positions wherein such first interception element may be stopped by a progressive adjustment of the section of the through-lumen of the gas.

**[0015]** In one embodiment, the second interception element 20 is movable only between an open position and a closed position of a through-lumen of the gas from the inlet duct 12 to the second outlet duct 16.

**[0016]** For example, each interception element 18, 20 comprises an axially movable shutter. In an embodiment illustrated in the drawings, wherein the valve is manually controlled by an adjustment knob 30 rotatable around a vertical axis, such shutters are movable vertically.

**[0017]** In one embodiment, the first interception element 18 is axially movable by means of a screw system.

**[0018]** In one embodiment, the second interception element 20 is normally found in a raised closed position of the respective through-lumen of the gas, made to stay in such position by an elastic element, such as a spring 202.

**[0019]** The interception elements 18, 20 further comprise respective first (18') and second (20') actuator stems projecting from the valve body 10.

**[0020]** In one embodiment, these actuator stems 18', 20' are parallel to each other and protrude vertically from an upper horizontal surface 10' of the valve body 10.

**[0021]** As mentioned above, the valve 1 further comprises an adjustment knob 30 which may be operated by a user. Such adjustment knob 30 extends above the upper horizontal surface 10' from which the actuator stems 18', 20' protrude.

**[0022]** The adjustment knob 30 is suitable to engage the actuator stems 18', 20' and is rotatable between an off position, wherein both the first interception element 18 and the second interception element 20 close the through-lumens of the gas, a stand-by position, wherein the first interception element 18 is controlled by the adjustment knob 30 to prevent the passage of gas from the inlet duct 12 to the first outlet duct 14 and wherein the second interception element 20 allows the passage of the gas from the inlet duct 12 to the second outlet duct 16, and an adjustment position, wherein both the first interception element 18 and the second interception element 20 allow the passage of gas towards the outlet ducts 14, 16.

**[0023]** In one embodiment, the knob 30 is also axially movable to push the second actuator stem 20' down-

wards to open the through-lumen of the gas intercepted by the second interception element 20 and thus supply a flow of gas for lighting the pilot burner 106.

**[0024]** In one embodiment, rotating the adjustment knob 30 causes the rotation of the first actuator stem 18' which screws or unscrews in a threaded hole made in the valve body 10. For example, the first actuator stem 18' is provided with an actuator sprocket 18a which engages with a knob sprocket 18b integral with the adjustment knob 30.

**[0025]** In one embodiment, the adjustment knob 30 has a lower pilot burner control appendage 302, which, once the second interception element 20 has been pushed into the open position, keeps such interception element in the open position when the knob 30 is rotated in a temperature increasing direction which allows the first actuator stem 18' to rotate in a direction to progressively open the first interception element 18 (Figure 3a).

**[0026]** By turning the knob 30 in the opposite direction, the first interception element 18 is progressively closed, and, after the through-lumen of the gas to the main burner 104 is closed by the first interception element (stand-by position), the second actuator stem is disengaged from the lower pilot burner control appendage and may be switched upward, closing the relative through-lumen (completely off position).

**[0027]** It should be noted that the adjustment knob 30 is provided with a lower limit switch appendage 304 which delimits, with the lower pilot burner control appendage 302, a shutdown window 306 which allows the second actuating rod 20' to be raised into the closing position. Such lower limit switch appendage 304, abutting against an end portion of the second actuator stem 20', prevents the knob 30 from continuing to rotate in the same direction for more than one revolution which would damage the valve.

**[0028]** It should also be noted that such lower limit switch appendage 304 extends inferiorly further than the lower pilot burner control appendage 302.

**[0029]** An example of embodiment of the valve described above is the thermostatic valve produced by the company Sit Group under the trade name "630 Eurosit". The operation of this thermostatic valve is therefore known to the person skilled in the art and does not require further explanation.

**[0030]** This valve, however, does not comply with the aforementioned UNI EN 449 standard, since, as mentioned, it also allows the pilot burner 106 to be switched off (completely off position).

**[0031]** According to one aspect of the invention, in order to satisfy the UNI EN 449 standard, the thermostatic valve is further provided with a stop member 50 suitable to prevent a rotation of the adjustment knob 30 from the stand-by position to the completely off position.

**[0032]** In an embodiment illustrated in the drawings, this stop member 50 is made in a retaining bracket 52 fixed to the valve body 10 and extending around the adjustment knob 30. In this retention bracket 52, a bracket

opening 54 is made, for example, of a substantially circular shape, in which the adjustment knob 30 is inserted and which therefore allows the retention bracket 52 to be applied to the thermostatic valve 1 without having to disassemble it.

**[0033]** For example, the stop member 52 is composed of a radial retention tooth which extends into the bracket opening 54 so as to engage the lower limit switch appendage 304 (Figure 3), allowing the lower burner control appendage 302 to rotate above it so as to allow the temperature to be adjusted (Figures 3a and 3b).

**[0034]** In other words, the radial retention tooth 52 prevents the shutdown window 306 from coming into contact with the second actuation rod 20', thus preventing its lifting and consequently preventing the interruption of the gas flow toward the pilot burner 106.

**[0035]** In one embodiment, the retention bracket 52 extends parallel to the upper horizontal surface 10' of the valve body 1'. For example, the retention bracket 52 is shaped in an inverted "U" so as to overlap at least partially with the valve body 10.

**[0036]** The retention bracket 52 may, for example, be fixed to the valve body 10 by means of locking screws 55 which connect the opposite side walls 56 of the retention bracket which extend along the sides of the valve body, passing through respective holes 57 formed in the valve body 10.

**[0037]** Another object of the present invention is a gas stove 100 for heating interior spaces, provided with the thermostatic valve 1 according to one of the embodiments described above.

**[0038]** With reference to figures 4, 5-5b, the stove comprises a tank 102 containing pressurized gas. The tank 102 is of the stove-side type, i.e., it is housed in a tank compartment 102' formed by an external casing 108 of the same stove. For example, the outer casing 108 comprises a base 108' resting on castors 109. The outer casing 108 may further comprise an upper cover 111.

**[0039]** The tank 102 is provided with a tank cock 112 suitable for opening/closing the gas inlet pipe 120 connected to the inlet pipe 12 of the thermostatic valve 1.

**[0040]** As described above, the thermostatic valve distributes the gas to a pilot burner 106 and to at least one main burner 104.

**[0041]** In one embodiment, the gas stove is also provided with means for regulating or stabilizing the pressure and/or gas flow rate from the tank 102.

**[0042]** In one embodiment, the stove 100 is also provided with a temperature probe 60 and a thermocouple - not shown - connected to the thermostatic valve 1.

**[0043]** In one embodiment, the stove 100 is also provided with a pilot flame igniter 70, for example of a piezoelectric type.

**[0044]** In one embodiment, the adjustment knob 30 and, if present, the pilot flame igniter 70, are accessible from the outside through respective access openings 30', 70' formed in the upper cover 111. In an embodiment shown in the drawings, such access openings 30', 70'

are formed in a covering tray 80 positioned in a tray opening 111' formed in the cover 111 and fixed, for example by screws, to the retention bracket 52.

**[0045]** The invention thus conceived therefore achieves the foregoing objectives.

**[0046]** In particular, the thermostatic valve according to the invention is advantageously based on a temperature control valve of a gas heating apparatus already available on the market and of proven reliability and efficiency. Such valve allows, for example, a complete shutdown of the main burner when the room reaches the desired temperature.

**[0047]** In conclusion, the retention bracket according to the invention offers the following advantages:

- it allows a temperature adjustment valve and open/close valve of the gas flow to perform only the adjustment function, avoiding the complete closure of the gas flow directed to the pilot burner;
- it is economical to implement and does not require any maintenance;
- it is applicable to different models of stoves;
- it is applied directly to the adjustment and closing means;
- it is simple and quick to assemble.

**[0048]** Obviously, the invention assumes, in its practical implementation, forms and configurations other than those illustrated without, for this reason, departing from the present scope of protection.

**[0049]** In addition, all details may be replaced by technically equivalent elements and the dimensions, shapes and materials used may be of any kind according to the need.

## Claims

1. Thermostatic valve for controlling a gas stove, comprising

- a valve body in which at least one gas inlet duct is made which can be connected to an inlet pipe from a tank, at least a first gas outlet duct which can be connected to an exit pipe leading to the main burner of the stove, and a second gas outlet duct which can be connected to a pilot burner, wherein the valve body houses at least a first interception element suitable to regulate the passage of gas from the inlet duct to the first outlet duct and a second interception element suitable to regulate the passage of gas from the inlet duct to the second outlet duct, said interception elements comprising respective first and second actuator stems protruding from the valve body;
- an adjustment knob which engages said actuator stems and which is rotatable between an

- off position, wherein both the first interception element and the second interception element prevent the passage of gas towards the respective outlet ducts, a stand-by position, in which the first interception element is controlled by the adjustment knob to prevent the passage of gas from the inlet duct to the first outlet duct and wherein the second interception element allows the passage of the gas from the inlet duct to the second outlet duct, and an adjustment position, wherein both the first interception element and the second interception element allow the passage of gas towards the respective outlet ducts, the thermostatic valve being **characterized in that** it comprises a stop member suitable to prevent a rotation of the adjustment knob from the stand-by position to the completely off position.
2. Valve according to claim 1, wherein the first interception element is axially movable by a screw system.
  3. Valve according to claim 1 or 2, wherein the second interception element is normally in a raised closed position of the respective through-lumen of the gas, influenced to stay in such position by an elastic element, such as a spring.
  4. Valve according to any of the preceding claims, wherein the adjustment knob is also axially movable to push the second actuator stem downwards to open the through-lumen of the gas intercepted by the second interception element and thus supply a flow of gas for lighting the pilot burner.
  5. Valve according to any one of the claims 2-4, where the adjustment knob, by rotating, causes the rotation of the first actuator stem which screws or unscrews from a threaded hole made in the valve body.
  6. Valve according to any of the preceding claims, wherein the adjustment knob has a lower pilot burner control appendage which, once the second interception element has been pushed into the open position, keeps such interception element in the open position when the knob is rotated in a temperature increase direction which allows the rotation of the first actuator stem in a direction of progressive opening of the first interception element.
  7. Valve according to the preceding claim, wherein the adjustment knob is fitted with a lower limit switch appendage which defines, with the lower pilot burner control appendage, a shutdown window which allows the second actuator stem to rise up into the closed position, said lower limit switch appendage being suitable to abut against an end portion of the second actuator stem.
  8. Valve according to the preceding claim, wherein the lower limit switch appendage extends downwards more than the lower pilot burner control appendage.
  9. Valve according to any of the preceding claims, wherein the stop member is made in a retention bracket secured to the valve body and extending around the adjustment knob.
  10. Valve according to the preceding claim, wherein a bracket opening is made in the retention bracket, for example of a substantially circular shape, through which the adjustment knob extends, the stop member consisting of a radial retention tooth which extends into the bracket opening in order to engage the lower limit switch appendage and so as to allow the lower pilot burner control appendage to rotate above it.
  11. Valve according to any one of the claims 9 and 10, wherein the retention bracket extends parallel to an upper horizontal surface of the valve body from which the actuator stems protrude, and which is shaped as an inverted "U" so as to at least partially superpose the valve body.
  12. Valve according to the preceding claim, where the retention bracket is attached to the valve body by locking screws which connect opposite side walls of the retention bracket which extend along the sides of the valve body, said locking screws inserting themselves in respective holes made in the valve body.
  13. Gas stove for domestic heating not connectable to a flue gas exhaust duct, comprising:
    - a tank containing gas under pressure housed in a tank chamber made in the stove, the tank being fitted with a tank cock suitable to turn on/off the gas flow from the tank;
    - a thermostatic valve according to any of the preceding claims connected to the tank via a gas inlet pipe;
    - a main burner connected to the first outlet duct of the thermostatic valve;
    - a pilot burner connected to the second outlet duct of the thermostatic valve.
  14. Stove according to the preceding claim, comprising a base resting on castors.

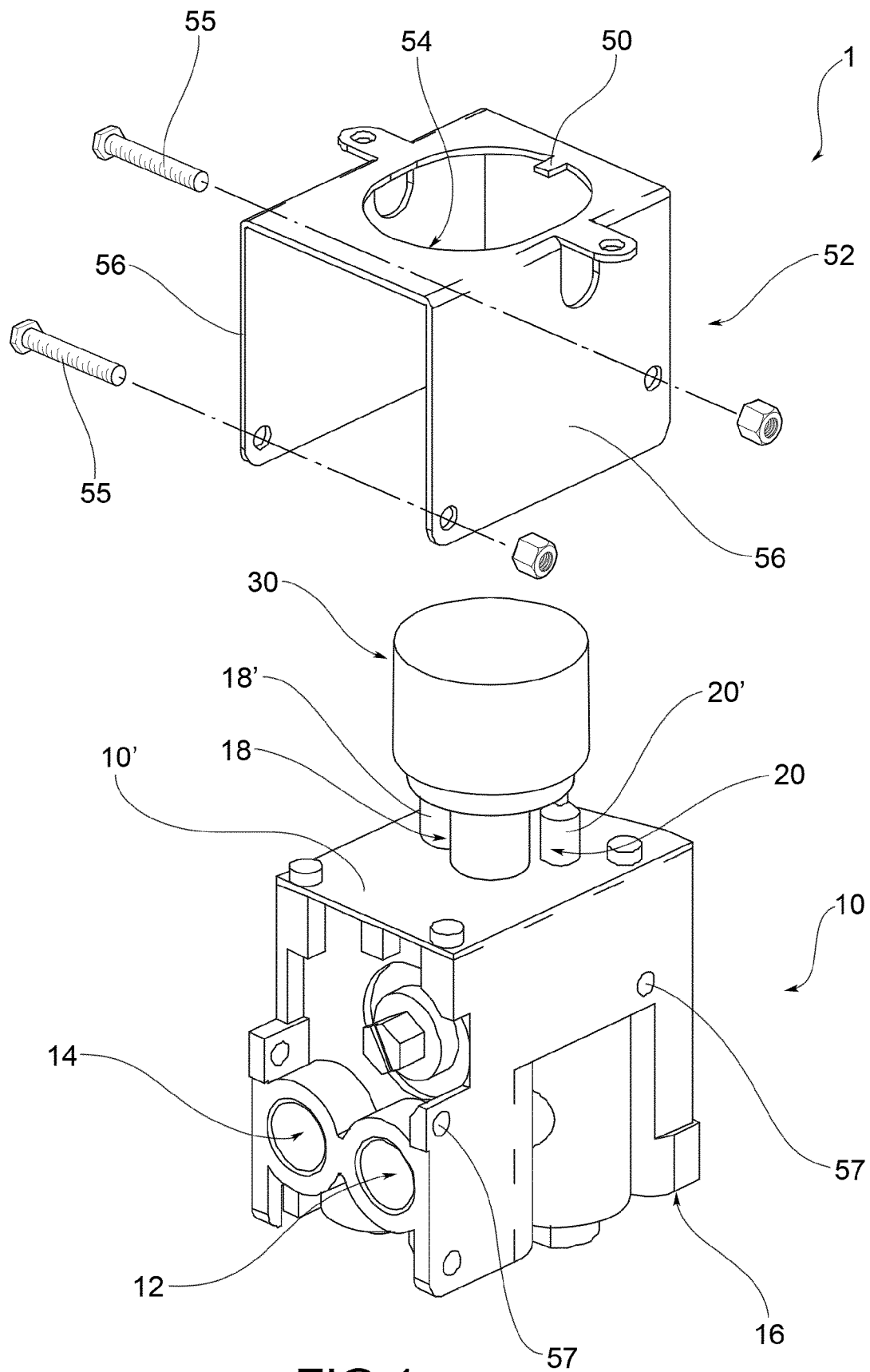
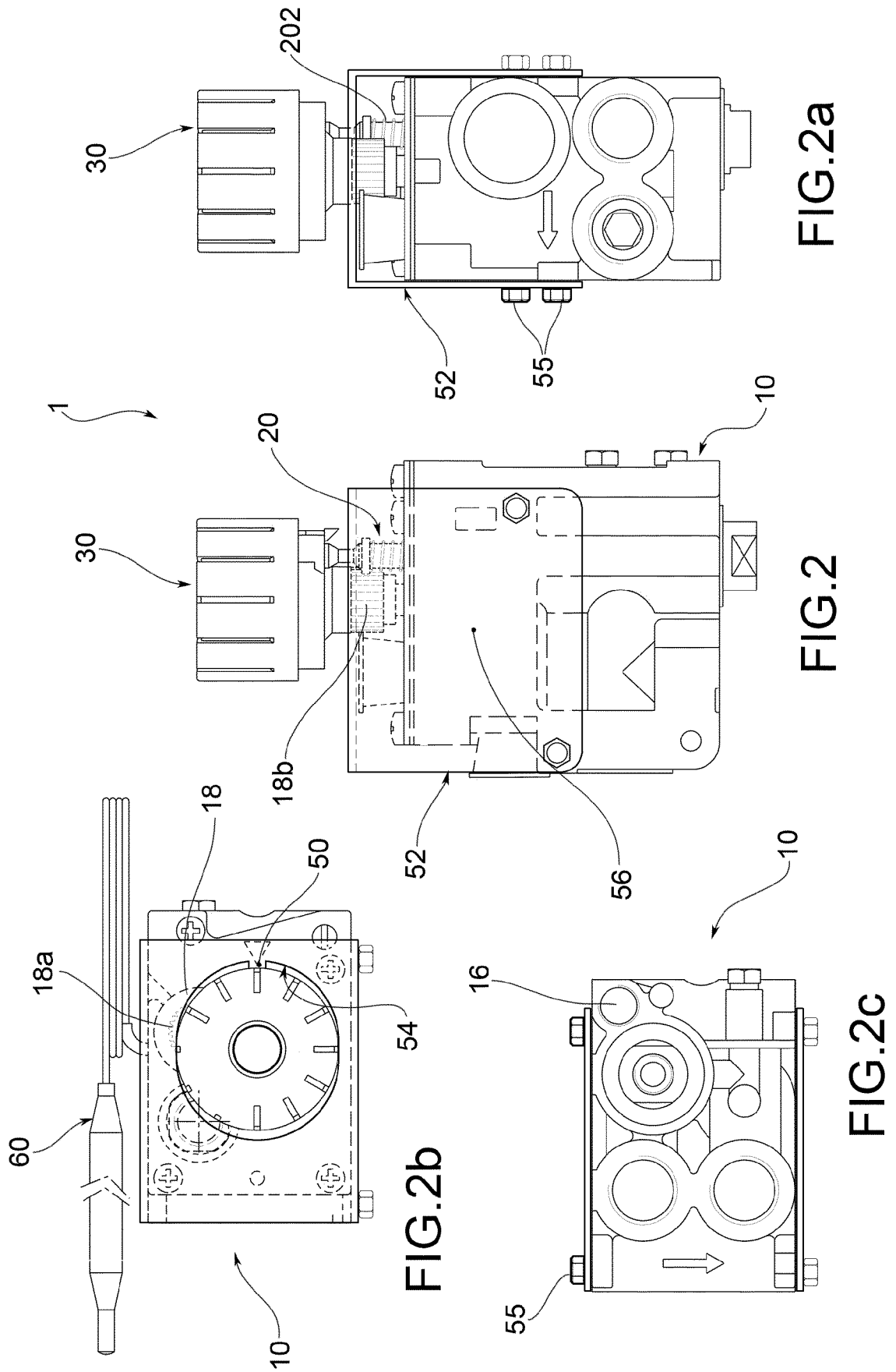
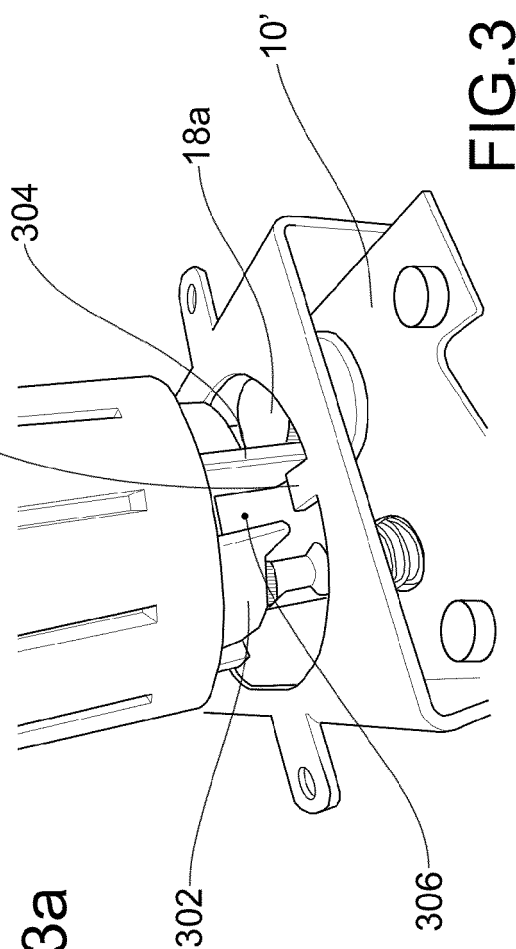
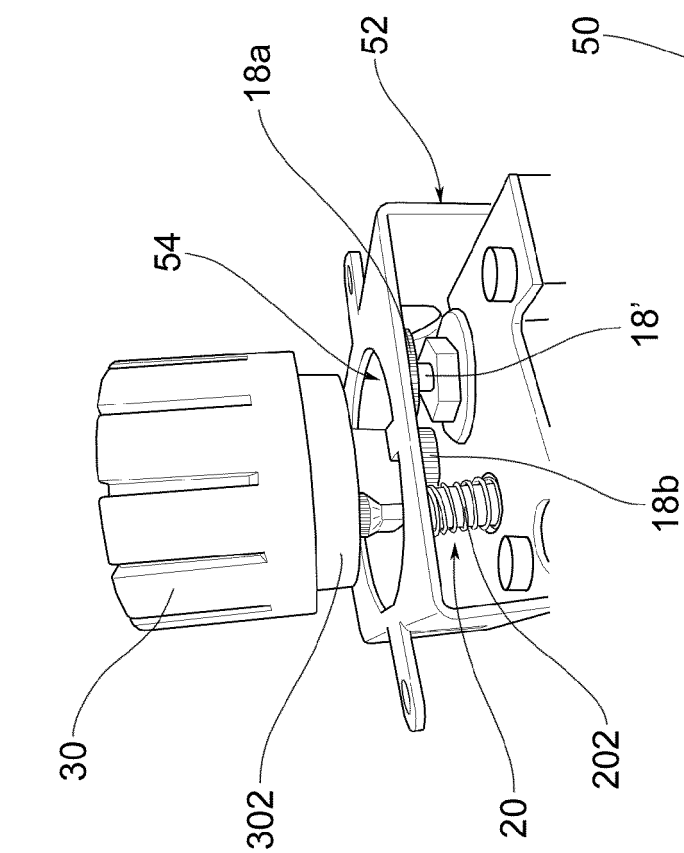
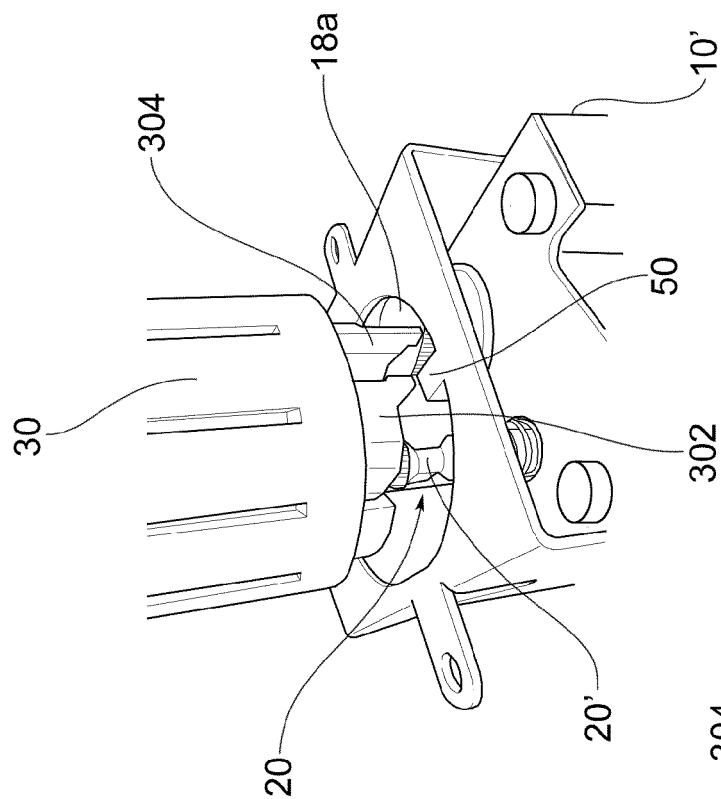


FIG.1







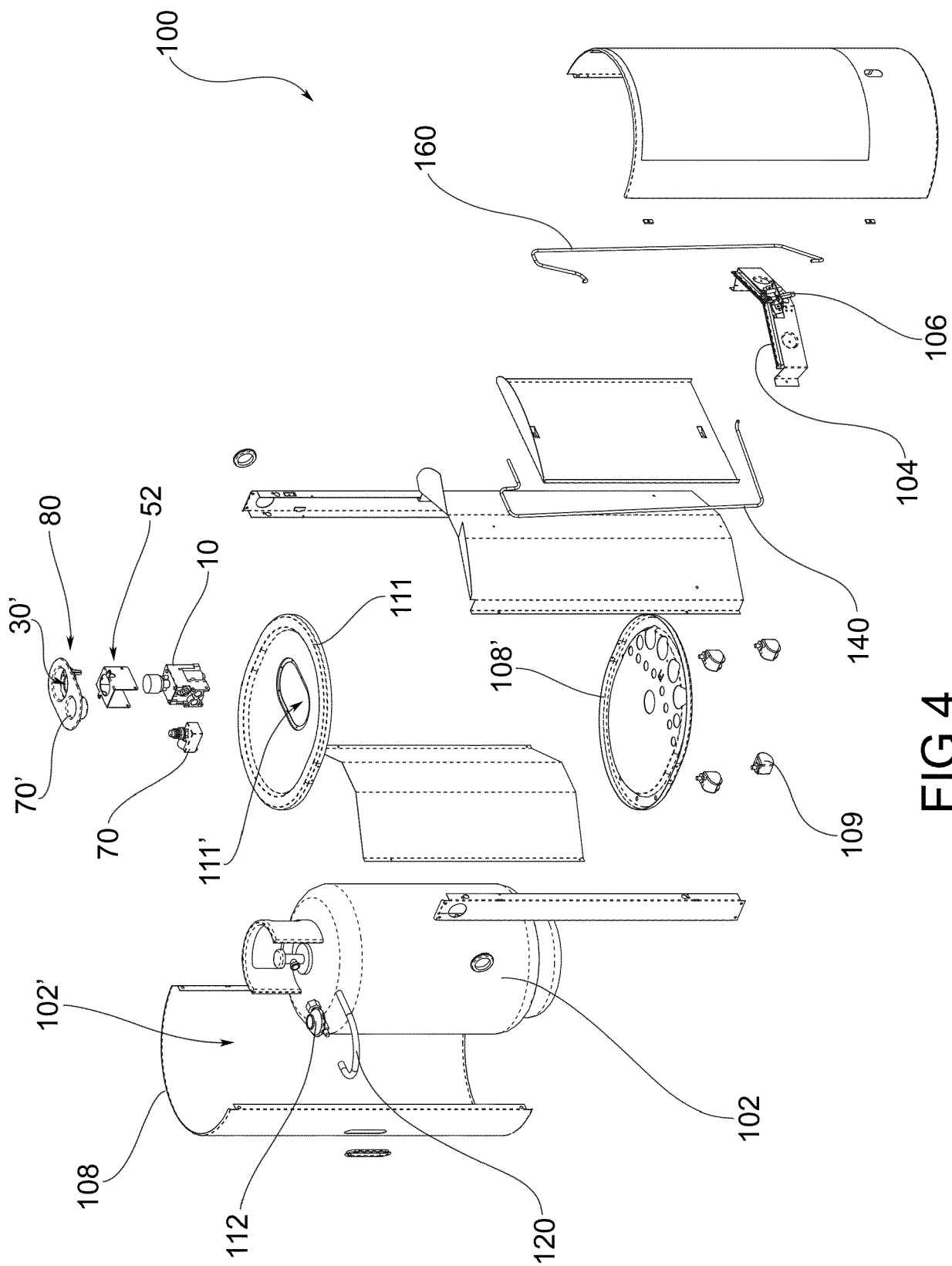


FIG.4

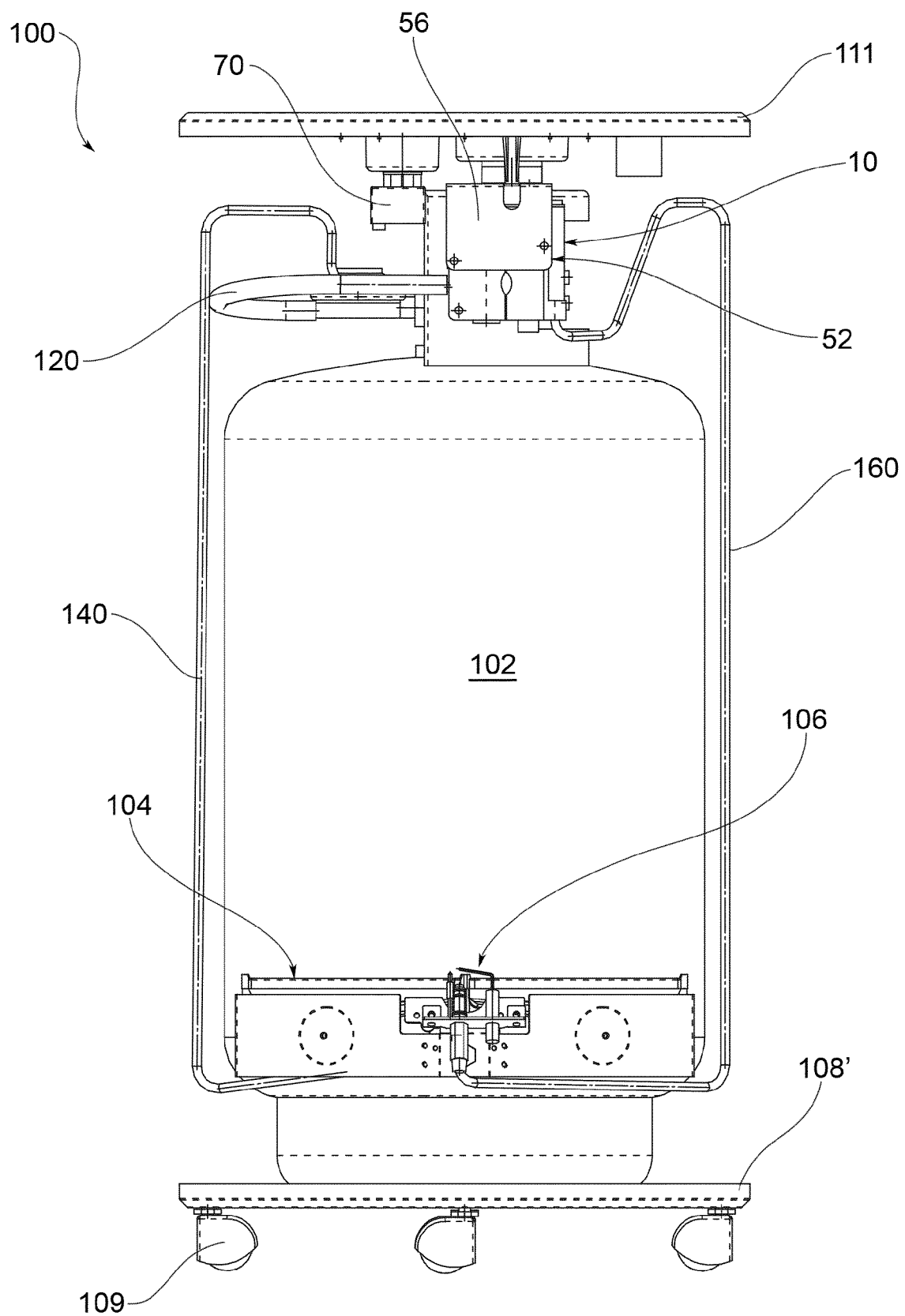


FIG.5

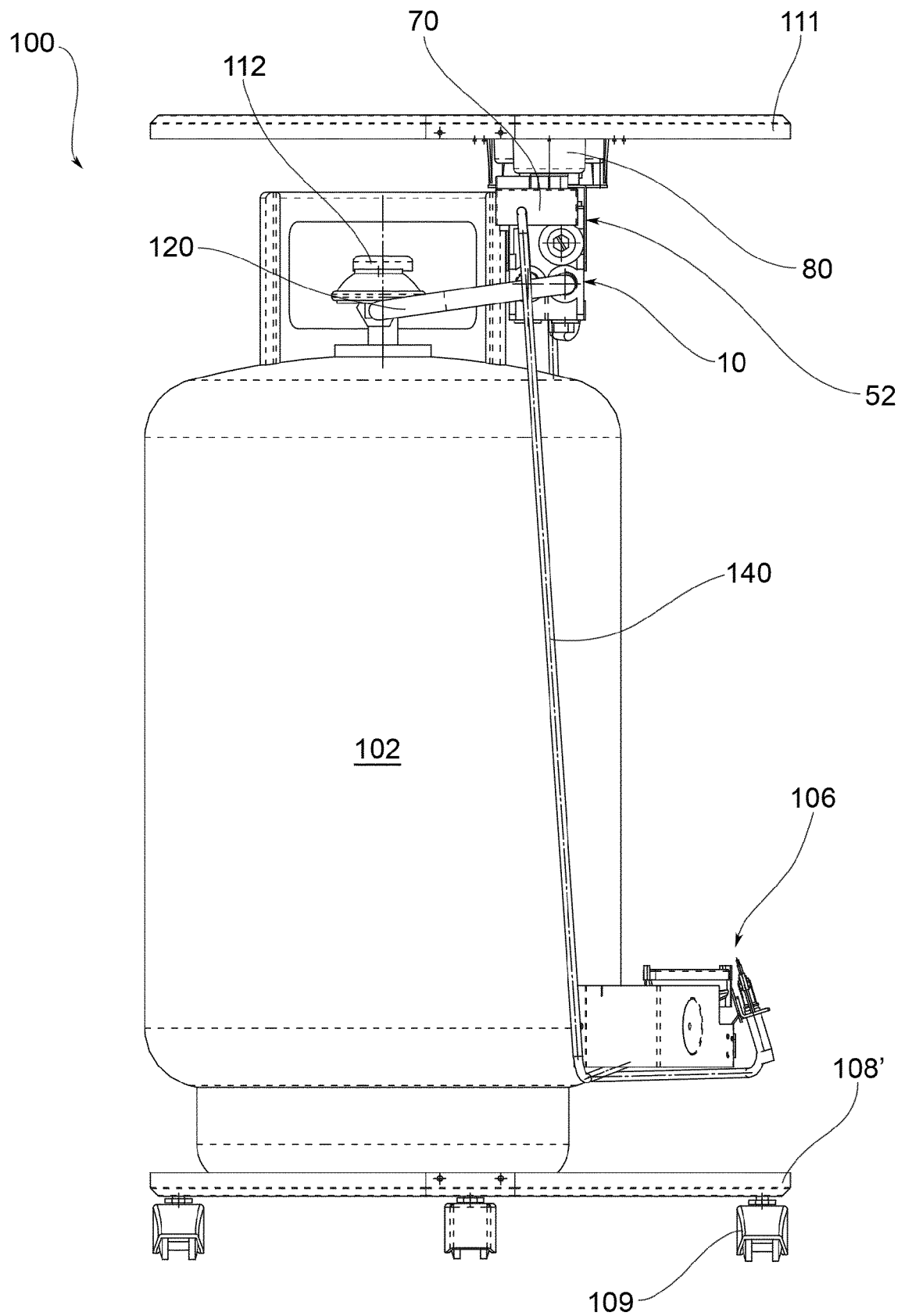


FIG.5a

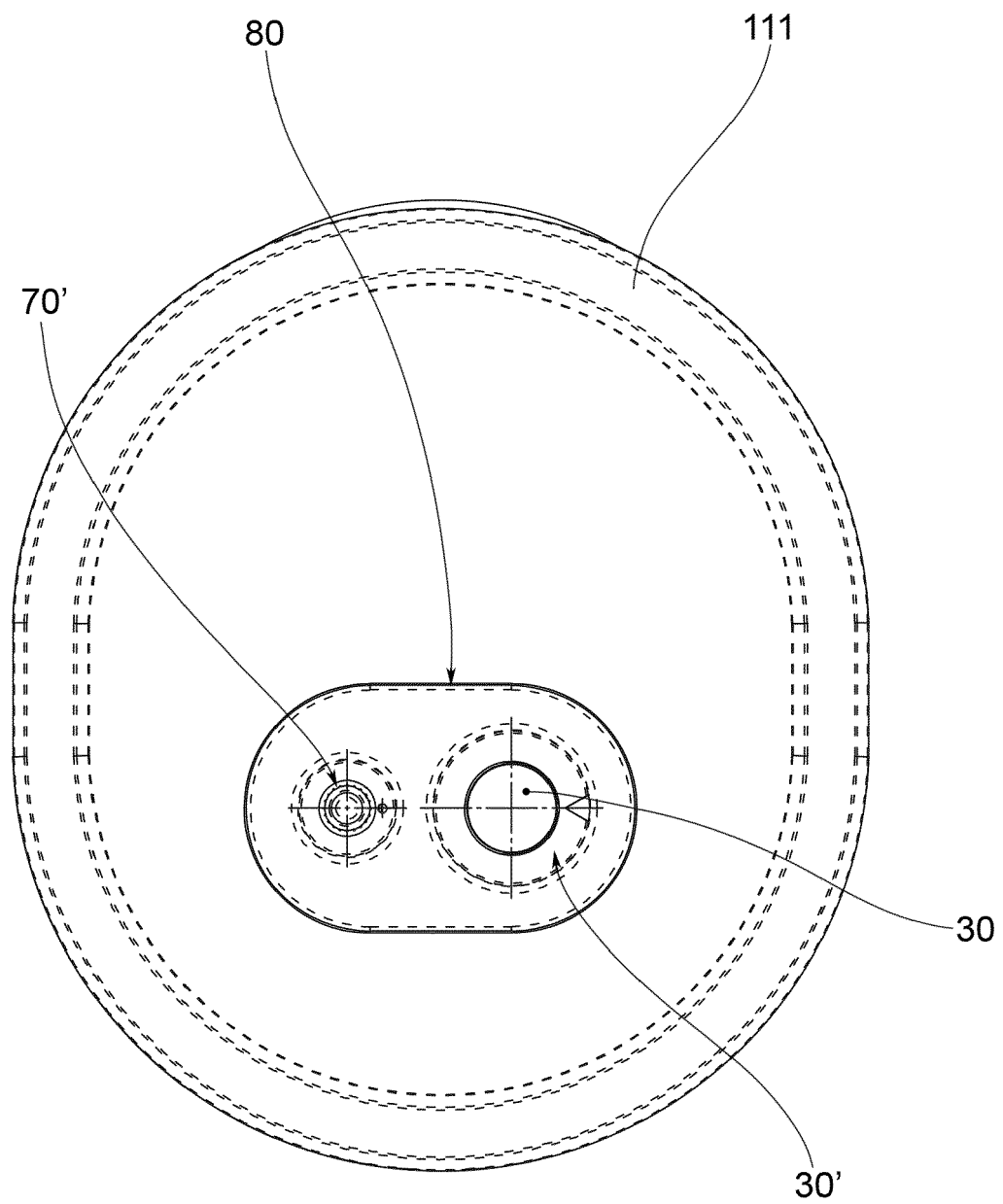


FIG.5b



## EUROPEAN SEARCH REPORT

 Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                   |                                                 |                                            |
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| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                     | Relevant to claim                               | CLASSIFICATION OF THE APPLICATION (IPC)    |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                   |                                                 |                                            |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                   | Date of completion of the search<br>2 July 2018 | Examiner<br>Coli, Enrico                   |
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## EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                 |                                                        |                                         |
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| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                                   | Relevant to claim                                      | CLASSIFICATION OF THE APPLICATION (IPC) |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                 |                                                        | TECHNICAL FIELDS SEARCHED (IPC)         |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                 | Date of completion of the search<br><b>2 July 2018</b> | Examiner<br><b>Coli, Enrico</b>         |
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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