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Albizuri

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(54) **MULTI-GAS VALVE FOR A GAS BURNING APPLIANCE**

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(*) Notice: This patent is subject to a terminal disclaimer.

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Issued: **Jun. 21, 2011**
Appl. No.: **12/639,856**
Filed: **Dec. 16, 2009**

U.S. Applications:

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**

F23N 3/02 (2006.01)
F23C 1/08 (2006.01)
F23N 1/00 (2006.01)

(52) **U.S. Cl.**

CPC ***F23C 1/08*** (2013.01); ***F23N 1/007*** (2013.01); ***F23N 3/02*** (2013.01); *F23N 2035/16* (2013.01);

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(58) **Field of Classification Search**

CPC ... F23C 1/08; F23N 7/007; F23N 3/02; F23N 2035/16; F23N 2037/08; F23N 2041/04

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(57) **ABSTRACT**

[The cooking appliance (**1**) having a control panel (**2**) is equipped with one or more gas flow (Q) regulating valves, wherein the rotary regulating plug (**6**) is provided with various peripheral through holes (**16-19**). The control knob (**9**) being interchangeable for fitting to the actuating shaft (**7**), is chosen from the two units available, one and the other permitting different angular limit positions of the regulating plug (**6**) for the supply of a constant minimum gas flow Qmin, adjusted each one for a different type of gas N gas or

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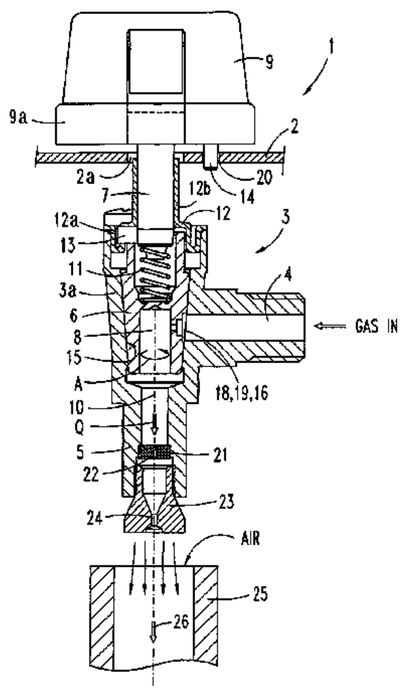

LP gas. The outlet conduit (**5**) of the valve is equipped with a further injector nozzle (**21**,**23**) for adjusting a constant gas flow Qmax to be fed into the conduit (**25**) of the correspondent burner, when the cooking appliance is supplied with a LP gas.**]** *A valve adapted to regulate the flow of both a natural gas and a liquefied petroleum gas. According to one implementation the valve includes a valve body having a rotatable regulating organ positioned between a valve inlet and a valve outlet, the valve outlet having a first restriction and a second restriction successive to the first restriction, the first restriction including a first hole calibrated to provide a given maximum flow rate of the natural gas at a first pressure in the absence of the second restriction, the second restriction removeably attached to the valve outlet, the second restriction including a second hole calibrated to provide a given maximum flow rate of the liquefied petroleum gas at a second pressure.*

15 Claims, 1 Drawing Sheet

Related U.S. Application Data

continuation of application No. 11/143,785, filed on Jun. 1, 2005, now abandoned.

(52) **U.S. Cl.**
CPC *F23N 2037/08* (2013.01); *F23N 2041/04* (2013.01)

(58) **Field of Classification Search**
USPC ..... 126/25 R, 39 E, 39 N, 39 R; 137/269, 137/270; 251/127, 205–209, 92; 16/441; 431/2, 12, 18, 61, 62, 65, 72, 354
IPC F23N 1/00,3/02, 14/00, 14/02, 14/04
See application file for complete search history.

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Defendant's Initial Disclosures; *Coprecitec, S.L., et al.* v. *The Brinkmann Corporation*, United States District Court, Northern District of Georgia, Atlanta Division, civil action file No. 1:12-CV-1480-AT, all pp. 1-16 thereof, together with Attachments A and C, all pages thereof and the Certificate of Service, one page, all pages of the document attached hereto, filing dated Aug. 13, 2012, filed by Angela M. Spivey of McGuire Woods LLP, Atlanta, Georgia.

Defendant's Invalidity Contentions; *Coprecitec, S.L., et al.* v. *The Brinkmann Corporation*, United States District Court, Northern District of Georgia, Atlanta Division, civil action No. 1:12-CV-1480-AT, all pp. 1-16 thereof, together with Attachment, Exhibit A, all pp. 1-23 thereof and the Certificate of Service, two pages; all pages of the document attached hereto, filing dated Oct. 19, 2012, filed by Angela M. Spivey of McGuire Woods LLP, Atlanta, Georgia.

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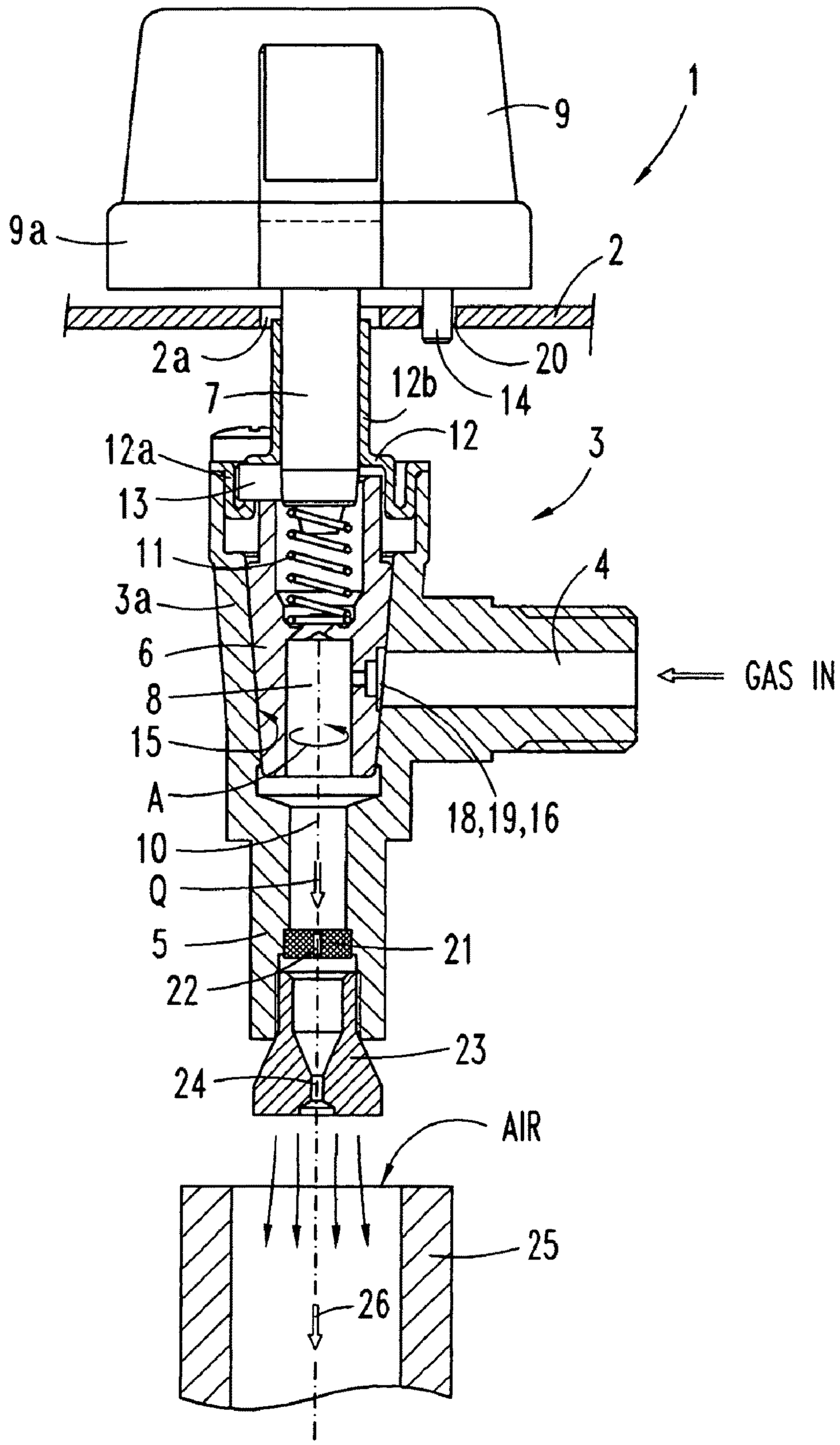
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MULTI-GAS VALVE FOR A GAS BURNING APPLIANCE

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; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

The present application is a continuation application of copending patent application Ser. No. 12/069,657, filed on Feb. 12, 2008, which is entitled "MULTI-GAS COOKER, WITH A ROTARY VALVE PROVIDED WITH INTERCHANGEABLE REGULATING MEANS", which is a continuation of patent application U.S. Ser. No. 11/143,785, which was filed on Jun. 1, 2005, and claims priority to Spanish Patent Application ES-U200500309, which was filed on Feb. 10, 2005, the disclosures of all of which being herein incorporated by reference.

TECHNICAL FIELD

The present invention relates to a gas valve of the conical rotary plug type attached to an actuating shaft, being the gas valve mounted on the panel of a cooking appliance and its outlet conduit faced to a burner inlet, wherein the rotary plug is provided with a control knob, and aperture means for adjusting the flow rate according to the fuel gas family supplied to the cooking appliance, and the outlet conduit with an injection means.

PRIOR ART

Gas valves of the above-defined type are already known, wherein the gas valve is mounted on the front control panel with the actuating shaft passing through a external control panel in the appliance, and the valve body resting inside the appliance faced to the fuel inlet of a burner. The external free end of the actuating shaft is fitted with a rotary control knob inserted in the latter. The control knob is removable from the shaft by pulling it out. The hollow body of the valve has its own gas outlet conduit which is connected to the respective appliance burner. The outlet conduit is provided with an injector nozzle having a calibrated discharge orifice in correspondence with the gas family supplied to the appliance, LP gas or N gas. In the spacing apart between the discharge nozzle of the valve and the burner inlet, is taken the primary air to feed the fuel mixture into the burner.

An example of rotary valve of the above type is disclosed in U.S. Pat. No. 6,520,481-B2, having its actuating shaft coupled to a frusto-conical regulating plug or valve plug, which is able to rotate a given angle for the supply of a gas flow from two angular positions spaced around 120.degree. apart, corresponding respectively to a high or maximum flow "Qmax" and to a low or minimum flow "Qmin", the latter applied to "gentle boiling". The rotation of the shaft as far as one of the angular positions, is started from an initial valve closed "OFF" position.

In this type of known valves the actuating shaft has a pin protruding in a radial direction to limit its angular travel, guided on a circular surface in the inner face of the body cover or valve cap, or in some other part of the valve body. The total travel of the regulating plug thus limited is, for instance, 270 degrees from the OFF position. The end position corresponds to Qmin. Any of the flows Qmax, Qint (intermediate flow) and Qmin is regulated by way of a corresponding hole or groove in the regulating plug facing the outlet conduit. All the flow rate are supplied from a common inlet conduit through an inner chamber in the regulating plug which is in communication with an outlet conduit. The Qmin outlet hole or groove shaped opening has an area of calibrated section for a standard type of given fuel gas, adjusted according to the output power of the cooking appliance burner.

Solutions are already known for a single valve to be mounted on cooking appliances that use two different types of gas, such as natural gas (NG) or liquefied petroleum gas (LPG). For example in U.S. Pat. No. 5,009,393, an additional valve element in the form of a sleeve is inserted in the inner chamber of the valve regulating plug. The area of the opening section for the passage of gas flow towards the outlet, that which corresponds to low flow or minimum flow Qmin, is adjusted by rotating this added valve sleeve which thus modifies the uncovered section area of the outlet opening. This known solution has the disadvantage that for adjusting the Qmin for the rotation of the valve sleeve, it is necessary to use a screwdriver, which has to be inserted from an opening in the actuating shaft until it reaches the valve sleeve and to transmit a precise turn. A known regulating gas valve, for example the disclosed in U.S. Pat. No. 4,947,891-A, comprises a rotary valve plug coupled to a passage disc provided aperture means for regulating the gas flow supplied to the burner, and an injector nozzle threaded to the outlet conduit. The passage disc is held stationary in the valve housing, and provides an arc groove restricting the passage area for the flow, for use with both LP gas and N gas, while the injection orifice of the nozzle is limiting the large changes of gas flow.

DISCLOSURE OF THE INVENTION

The object of the invention is a gas domestic cooking appliance, provided with at least a rotary valve of the type with a frusto-conical regulating plug coupled to an actuating shaft and to a control knob, being capable of supplying the different required flows of gas lying at a plurality of angular positions, of either of the two different types of gas, N gas or LP gas, the valve having a control knob being interchangeable on the actuating shaft, with a means for limiting the angle of rotation of the regulating plug, and a mountable injector nozzle in the valve outlet conduit, which can be or not provided, in order the valve to be adapted to the type of gas used by the appliance.

The use of a single valve unit for regulating the flow of two different gas families is an advantage of the gas valve invention, when mounted on a cooking appliance. During the startup of the cooking appliance the user only has to carry out a choice for a control knob from the two possible units accompanying the valve in accordance with the type of fuel gas NG or LP appropriate for the cooking appliance. In this way, there is no need to use tools for adjusting the flow, nor to learn how to adjust the regulating plug as is required in the prior art valve.

The gas valve according to the invention is capable of providing two angular positions of the regulating plug, both spaced apart from each other to supply a different minimum flow Qmin according to the type of gas, NG or standard LPG, used as the fuel for the appliance, being the two different angular positions established by means of a respective rotation stop. At the same time, the user chooses for providing or not the outlet conduit of the valve with an

injector nozzle to supply a maximum flow, Qmax, of LP gas or N gas respectively. Neither it is necessary to use tools for carrying out this mounting operation.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view of a gas valve according to the invention, fitted on a panel of a cooking appliance.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

In reference to FIG. **1**, an embodiment of a gas cooking appliance **1** such as a barbecue comprises a control panel **2** on which are mounted one or more rotary gas valves **3** of the type with a frustro-conical regulating plug **6**. The cooking appliance **1** may be of two types in respect of the type of gas supplied, natural gas (NG) or liquefied gas (LPG) from the external source—GAS IN—through a valve inlet conduit **4** in the valve body **3**a. Each one of the valves **3** mounted on the panel **2** is always of a single type, all with a same valve body **3**a and regulating plug **6**. The inlet flow "Q" is transmitted to an internal chamber **8** in regulating plug **6** in communication with an outlet conduit **5** in the valve body **3**a. The regulating plug **6** rotates around a central axis **10** actuated by shaft **7** for the supply of the flow "Q", which is directed towards a burner inlet duct **25** on the appliance, being the latter specifically adapted to either N gas or LP gas supplying.

The valve body **3**a has an elongated shape with a frusto-conical central housing cavity **15**, wherein the regulating plug **6** is pushed by a spring **11** for a tight sealing. The free end of the actuating shaft **7** is installed passing through a hole **2**a in the appliance panel **2**, and afterwards the user fits it with a control knob **9**, which is chosen from the two different units of control knob **9**, both supplied to the user with each valve unit **3**. A cover or valve cap **12** protecting the housing cavity **15**, has a tubular bushing **12**b for guiding the actuating shaft **7** in rotation.

The regulating plug **6** may rotate with the shaft **7** an angle "A" in either of the two directions from an initial angular position "zero" degrees corresponding to the valve closed condition "OFF", to an angular position "A" between 90.degree. and 270.degree. The OFF position is the initial end of the rotational travel "A", and it is established for example by a radial pin **13** on the shaft. The cover **12** presents a sliding surface for the radial pin **13**, up to a recess **12**a in the cover acting as a stop for the rotation of the radial pin **13**.

In reference to the valve embodiment represented in FIG. **1**, from the angular position OFF rotating in a clockwise direction, the frusto-conical plug **6** may regulate the supply of different gas flows, a maximum flow "Qmax", a minimum "Qmin" and an intermediate flow "Qint" between the Qmax and the Qmin, in function of the rotated angle "A". A constant minimum flow "Qmin" of the N gas must be higher than a "Qmin" of the LP gas, when supplied to a respective burner in both cases of the same power. In function of whether N or LP gas is supplied to the cooking appliance, the control knob **9** to be fitted on the actuating shaft **7** is distinguished for example by means of a lug **14** integral with the control knob. The control knob **9** represented on the appliance in FIG. **1** is adapted for the supply of N gas, having a protuberance or lug **14** projecting from a knob base **9**a facing the panel **2**. The second type of control knob **9** having not the protuberance **14**, is chosen for its mounting on a cooking appliance that uses LP gas.

The regulating plug **6** rotates to a determined angular position for the supply of a maximum flow "Qmax" of either NG or LPG on both types of cooking appliance **1**. The Qmax inflow is regulated by a through hole **16** in the regulating plug, facing the inlet conduit **4**. If the regulating plug **6** is rotated further, an intermediate flow "Qint" will be supplied through a groove which has a decreasing area. In accordance with the angle rotated, a through hole **18** or a through hole **19** for a "Qmin" flow is facing the inlet conduit **4** at an ensuing angular position different from one another depending on the gas supplied to the valve, N gas or LP gas respectively. Diameter of each one of holes **18** and **19** are calibrated for the correspondent supply of a Qmin.

When installed on the panel **2**, the control knob unit **9** chosen for the supply of LPG, this has no lug **14** or any other element for limiting the angle "A" of rotation. Thus, the regulating plug **6** may rotate as far as an angular position of 270 degrees. The cover **12**, provided with the tubular portion **12**b for guiding the valve shaft **7**, and said recess **12**a for limiting said longer angular travel corresponding to the LP gas Qmin, is made economically by die-stamping operations only. The economical cost of moulding two types of control knob **9**, with and without integral lug **14** for guiding its rotation, is also low.

Besides that described above, other embodiments of the regulating passage openings **18**,**19** for the different values of Qmin are possible. Half of the control knob **9** units of the kind applied to the NG appliance, may be manufactured with some integrated guiding means **14** on the control knob **9**, and interact with some part of the cooking appliance **1** associated with the panel **2**, for example a running slot **20** in a panel wall, in order a limit position to be arranged of rotation travel other than that imposed by the actuating shaft.

The arrangement of the two different stop means **12**a and **20**, respectively in the valve body **3**a and on the control panel **2**, each one with a pre-set circular extension, matches up with the two angular travels "A" corresponding to that of the two hole passages **18** and **19** for supplying a constant NG Qmin or a constant LPG Qmin. In this way, a single valve unit **3** is used, without having to make any adjustment, valid for any type of gas supplied to the cooking appliance **1**.

The burner of the cooker appliance (not represented in the drawing), supplied by the valve unit **3**, is placed with its feed conduit **25** facing the valve outlet conduit **5**. The space of air apart from the burner conduit **25** permits the fuel mixture **26** of primary air with the Qmax flow of outgoing gas from the valve **3** for injection into the burner feed conduit **25**.

In accordance with the type of gas, N gas or LP gas, in order to provide the valve **3** with means for adjustment and injection of the Qmax gas flow outgoing from the regulating plug **6**, the valve outlet conduit **5** has a press-in or threaded disc **21** inserted for the restriction of the Qmax flow through a calibrated central hole **22**, which permits the passage of a given Qmax flow of N gas, substantially higher than the Qmax of LP gas which it is necessary to inject into the burner of the same output. The restrictor disc **21** remains fitted on the valve all the time irrespective of the type of gas used. When the cooker appliance **1** is supplied with LP gas, it is necessary to restrict the outgoing Qmax flow so as to adapt the output of the burner, so the valve outlet conduit **5** is also fitted with an injection nozzle **23**, threaded manually into the mouth of the conduit **5**, and it has a calibrated hole **24** for a given Qmax flow of LP gas, substantially smaller than the hole in the restrictor disc, the latter secured in a manner valid for the passage of a Qmax both of N gas and of LP gas.

Thus, by means of the interchangeable control knob **9** and the installation or otherwise of the injection nozzle **23**, all the cooker appliances, whether they be N gas or LP gas, are fitted with the same valve units **3** without the need to make any flow regulating adjustment. Together with the valve unit **3**, the user receives a kit containing two different control knob units **9**, easily distinguishable from each other, and an injection nozzle **23**. In accordance with the type of gas used, the user chooses one of the controls **9** for manual installation on the actuating shaft **7**, and also decides whether or not to install the injection nozzle **23**, which is also fitted manually for the injection of LP gas without the need for tools.

What is claimed is:

[1. A valve comprising:

a valve body having a rotatable regulating organ positioned between a valve inlet and a valve outlet, the regulating organ configured to vary the flow rate of the gaseous fuel at the valve outlet as a function of an angular position of the regulating organ, a first angular position of the regulating organ determines a first minimum flow rate of a natural gas, and a second angular position of the regulating organ, successive to the first angular position, determines a second minimum flow rate of a liquefied petroleum gas,

a control knob used to manipulate the angular position of the regulating organ coupled to the regulating organ by an actuating shaft, the control knob having a feature to prevent rotation of the regulating organ beyond the first angular position, absent the presence of the feature on the control knob the regulating organ is rotatable to the second angular position,

the valve outlet having a restriction that determines a maximum flow rate of the natural gas.**]**

[2. A gas burning appliance adapted for a supply of natural gas and liquefied petroleum gas to a burner comprising:

at least one regulating valve with a valve body, the valve body having a rotatable regulating organ operationally coupled to an actuating shaft that protrudes from a control panel of the cooking appliance, the regulating organ positioned between a valve inlet and a valve outlet and configured to vary the flow rate of the gaseous fuel at the valve outlet as a function of an angular position of the regulating organ, a first angular position of the regulating organ determining a first minimum flow rate of the natural gas, and a second angular position of the regulating organ, successive to the first angular position, determining a second minimum flow rate of the liquefied petroleum gas,

a control knob attached to the actuating shaft useable to manipulate the angular position of the regulating organ, the control knob having a feature that cooperates with a part of the appliance other than the valve to prevent rotation of the regulating organ beyond the first angular position, the regulating organ rotatable to the second angular position successive to the first angular position absent the presence of the feature on the control knob,

the valve outlet having a restriction that determines a maximum flow rate of the natural gas.**]**

[3. The gas burning appliance of claim **2** wherein the feature of the control knob projects from a base of the control knob facing the control panel and travels within a groove in the control panel, the groove having an end corresponding to the first angular position.**]**

[4. The gas burning appliance of claim **2** wherein the actuating shaft has associated with it an engagement feature that cooperates with a part of the valve to impede rotation of the regulating organ beyond the second angular position.**]**

5. A valve adapted to regulate the flow of both a natural gas and a liquefied petroleum gas comprising:

a valve body having disposed therein a rotatable regulating organ positioned between a valve inlet and a valve outlet, the valve outlet having a first restriction and a second restriction successive to the first restriction, the first restriction comprising a first hole calibrated to provide a given maximum flow rate of the natural gas at a first pressure in the absence of the second restriction, the second restriction removeably attached to the valve outlet, the second restriction comprising a second hole calibrated to provide a given maximum flow rate of the liquefied petroleum gas at a second pressure, the second hole being smaller than the first hole, the regulating organ being configured to vary the flow rate of the gaseous fuel at the valve outlet as a function of an angular position of the regulating organ, a first angular position of the regulating organ determines a first minimum flow rate of the natural gas, and a second angular position of the regulating organ, successive to the first angular position, determines a second minimum flow rate of the liquefied petroleum gas, the valve further comprising a stop that prevents rotation of the regulating organ beyond the second angular position.

6. The valve according to claim 5, wherein the first restriction is formed within a press-in disc that is pressed in the valve outlet.

7. The valve according to claim 6, wherein the first restriction is formed within a press-in disc that is pressed in the valve outlet.

8. The valve according to claim 6, wherein the first restriction is formed within a threaded disc that is threaded in the valve outlet.

9. The valve according to claim 5, wherein the first restriction is formed within a press-in disc that is pressed in the valve outlet.

10. The valve according to claim 5, wherein the first restriction is formed within a threaded disc that is threaded in the valve outlet.

11. The valve according to claim 5, further comprising a control knob used to manipulate the angular position of the regulating organ coupled to the regulating organ by an actuating shaft, the control knob having a feature to prevent rotation of the regulating organ beyond the first angular position, absent the presence of the feature on the control knob the regulating organ is rotatable to the second angular position.

12. A gas burning appliance adapted for a supply of natural gas and liquefied petroleum gas to a burner, the gas burning appliance comprising:

at least one regulating valve with a valve body, the valve body having disposed therein a rotatable regulating organ operationally coupled to an actuating shaft that protrudes from a control panel of the cooking appliance, the rotatable regulating organ positioned between a valve inlet and a valve outlet, the valve outlet being in fluid communication with the burner,

the valve outlet having a first restriction and a second restriction successive to the first restriction, the first restriction comprising a first hole calibrated to provide a given maximum flow rate of the natural gas at a first pressure in the absence of the second restriction, the second restriction removeably attached to the valve outlet, the second restriction comprising a second hole calibrated to provide a given maximum flow rate of the liquefied petroleum gas at a second pressure, the sec-

ond hole being smaller than the first hole, the regulating organ being configured to vary the flow rate of the gaseous fuel at the valve outlet as a function of an angular position of the regulating organ, a first angular position of the regulating organ determines a first minimum flow rate of a natural gas, and a second angular position of the regulating organ, successive to the first angular position, determines a second minimum flow rate of a liquefied petroleum gas, the valve further comprising a stop that prevents rotation of the regulating organ beyond the second angular position.

13. The gas burning appliance according to claim 12, wherein the second restriction is removeably attached to the valve outlet by a threaded connection.

14. The gas burning appliance according to claim 13, wherein the first restriction is formed within a press-in disc that is pressed in the valve outlet.

15. The gas burning appliance according to claim 13, wherein the first restriction is formed within a threaded disc that is threaded in the valve outlet.

16. The gas burning appliance according to claim 12, wherein the first restriction is formed within a press-in disc that is pressed in the valve outlet.

17. The gas burning appliance according to claim 12, wherein the first restriction is formed within a threaded disc that is threaded in the valve outlet.

18. The gas burning appliance according to claim 12, further comprising a control knob attached to the actuating shaft useable to manipulate the angular position of the regulating organ, the control knob having a feature that cooperates with a part of the appliance other than the valve to prevent rotation of the regulating organ beyond the first angular position, the regulating organ rotatable to the second angular position successive to the first angular position absent the presence of the feature on the control knob.

19. The gas burning appliance according to claim 18, wherein the feature of the control knob projects from a base of the control knob facing the control panel and travels within a groove in the control panel, the groove having an end corresponding to the first angular position.

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