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(54) **A device for limiting the gas flow in a discharge valve for gas lighters and method of calibrating said device.**

(57) A device for limiting the gas flow in a discharge valve for gas lighter without flame adjustment has a filter limiting the flame height of the type compressed when mounting the device.

In order to compensate for changes in flame height with changes in temperature the filter (1) is compressed between two elements (3, 4) of different material having different linear thermal expansion coefficients, anchored (8) to each other at an end remote from the filter and free to expand independently of each other, due to temperature changes, at the other end.

The initial permanent calibration of the filter is carried out at a constant reference temperature, prior to the mounting of the device in the lighter, by measuring during the compression operation of the filter the flow of a fluid which is caused to flow through the filter, and stopping the compression when the flow of the fluid flowing through the filter has a value corresponding to the value of the predetermined gas flow and such as to limit the flame height at the desired value.

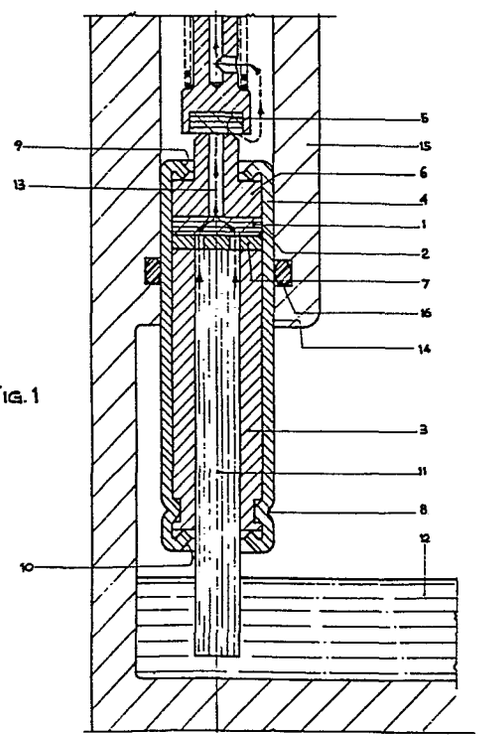

FIG. 1

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A device for limiting the gas flow in a discharge valve for gas lighters and method of calibrating said device

This invention relates to gas lighters and more particularly to a device for limiting the gas flow in a discharge valve of gas lighters without flame adjustment and a method of calibrating such a device.

That the gas lighters are or not provided with a flame height adjusting means to be operated by the user, they are generally provided with at least a filter limiting the flame height to a lower value than the maximum height permissible for security purposes. This filter is formed of a porous material such as fibers or foam and means are provided to adjust in the mounting operation the compression of such a filter according to the maximum desirable flow.

These means are comprised both of screwed elements which can become inaccessible to the user after the lighter is mounted, and of stop or similar elements limiting the stroke of the tools for mounting and/or deforming the pieces forming the valve, and of abutments limiting the angular movement of the adjusting ring nut of the lighter (see French patent No. 75.18161).

In any case all these means presume a regulation or adjust-

ment operation carried out during the mounting operation according to the flame height actually found on each lighter after the gas has been admitted into the tank.

The flame height is, however, predetermined according to a standard gas pressure at a standard reference temperature.

Since it is well known that the gas pressure changes in dependence of the temperature, all the systems used up to now for adjusting or predetermining the flame height in gas lighters cause appreciable changes in the flame height with changes in the ambient temperature.

This is particularly unsuitable in lighters without flame adjustment, to which the present invention refers, in terms of safety in use, but also particularly undesirable to the user as well as of influence on the gas lighting conditions in the case of piezoelectric or battery lighting.

This invention intends to obviate the above mentioned disadvantages of the prior art gas lighters, without flame adjustment, by providing a lighter of this type in which the flame height is kept nearly fixed with changes in the temperature and consequently in the gas pressure in the tank, by means of an automatic compensation for the delivered gas flow, and which is at the same time of a low manufacturing cost.

More particularly, it is an object of the invention to provide a device for limiting the gas flow in a discharge valve for gas lighters without flame adjustment and for automatically compensating for gas pressure differences in dependence of the temperature, of the type comprising a porous filter compressed

to a predetermined extent, characterized in that the filter is compressed between two elements of different material having different linear thermal expansion coefficients, anchored to each other at one end and free to expand independently of each other, due to temperature changes, at the other end.

Because of the different linear thermal expansion coefficient of the two elements between which the filter is compressed, in case of a change in the ambient temperature which would cause as a result a change in the gas pressure and consequently a change in the flame height, the compression on the filter also changes with changes in the temperature and causes the gas flow which flows through the filter to change correspondingly and, as a result, tends to prevent changes in the flame height. By means of a suitable choice of the material of the elements and a suitable sizing of the elements an automatic practically complete compensation for the differences in the gas pressure in dependence of the temperature can be obtained.

The effect of the filter compression correctly follows the change in the temperature if the two differential linear expansion elements are connected to each other at the end remote from the filter.

The linear length of the expansion elements is determined in dependence of their expansion coefficients with respect to the change of the porosity characteristics of the filter at different compression values in such a manner as to obtain a desired and nearly invariable value of the flame height whatever the ambient temperature may be.

The invention comprises also a method of calibrating the above mentioned gas flow limitation device, characterized in that the calibrating compression of the filter is carried out by means of an axial deformation of the jacket or by other mechanical pressure means until the gas flow is reduced to the predetermined value which is such as to limit the maximum flame height to the desired value.

The deformation of the jacket or the action of the mechanical pressure means is carried out at a standard reference temperature and the calibration value of the compression of the filter is controlled during the compression by means of a suitable apparatus which measures the flow of a fluid flowing through the filter.

The measuring apparatus can suitably consist of a compressed air flowmeter or any other means adapted to determine the calibration in dependence of a predetermined flame height, which flowmeter is associated to the control of the deformation equipment of the jacket so as to cause a stop in the deformation at the time the flow calibration reaches the predetermined value.

The invention will be better understood from the following detailed description, given merely by way of example and therefore in no limiting sense, of two embodiments thereof referring to the accompanying drawings, in which:

Fig. 1 is a partial axial cross-section of a valve for a gas lighter without flame adjustment provided with the gas flow limiting device according to the invention, obtained by means of a calibration carried out by deformation of the jacket;

Fig. 2 is an axial cross-section of a valve quite similar to that of Fig. 1 but with a calibration carried out by means of a mechanical pressure device acting on the inner element.

Referring first to Fig. 1, it is seen that the porous filter 1 for regulating the gas flow is contained in a variable volume chamber 2 suitably formed by a central cylindrical body 3 made of a material having a high linear expansion coefficient and covered outside by a jacket 4 made of a material having a low linear expansion coefficient. In order to contain the filter 1 and provide a projecting burner 5 adapted to make practical the construction of the gas discharge valve, a nozzle 6 and a washer 7 are interposed which are anyway without influence on the operation of the compensating device.

The jacket 4 is firmly anchored to the central cylindrical body 3 by means of a mechanical hooking 8 so as to cause an effective volumetric change of the chamber 2 at any minimum mutual dimensional change in the elements 3 and 4 with changes in the temperature.

The calibrating compression of the filter 1 is carried out by means of an axial deformation of the edges 9 and 10 of the jacket 4 at a standard reference temperature.

A porous dipping element 11 supplies gas in a liquid phase to the filter 1 by conveying it by capillarity from the tank 12.

It is in fact important that the conversion of the gas from the liquid phase to the gaseous phase takes place always in

the filter 1 and the passage 13 of the nozzle to avoid disturbing phenomena in the gas delivery.

The complete device is mounted and calibrated outside the lighter and can be mounted in the tank housing 15 f.e. by forcing it in a seat 14 by means of a suitable mechanical interference so as to prevent the flow of the gas outside the jacket 4.

This flow can be prevented also by means of a gasket 16 or by interposing a deformable and resiliant material of a different type.

From the above is seen that the limitation of the fixed flame height is determined by the compression of the filter 1 carried out originally by an axial deformation of the edges 9 and 10 of the jacket 4 at a standard reference temperature, by simultaneously measuring the flow of a fluid through the filter. This deformation operation of the edges 9 and 10 is stopped when the fluid flow reaches the desired value.

A suitable length sizing of the cylindrical body 3 and the jacket 4 determines a suitable higher compression of the filter 1 with increasing temperature and its suitable decompression with decreasing temperature; since the gas pressure increases and decreases respectively, the output flow is kept nearly constant and the flame height undergoes practically no appreciable changes.

In Fig. 2 there is shown an alternative embodiment of the device according to the invention in which, however, the

compression of the filter 1 is carried out originally by screwing the nozzle 6 in the jacket 4 by means of the thread 17 suitably locked permanently against unscrewing after calibration.

While but two embodiments of the invention have been shown and described, it is obvious that a number of changes and modifications can be made without departing from the scope of the invention.

Claims

1. A device for limiting the gas flow in a discharge valve for gas lighters without flame adjustment and for automatically compensating for gas pressure differences in dependence of the temperature, of the type comprising a porous filter compressed to a predetermined extent, characterized in that the filter is compressed between two elements of different material having different linear thermal expansion coefficients, anchored to each other at one end and free to expand independently of each other, due to temperature changes, at the other end.

2. A device as claimed in claim 1, characterized in that one of the elements is formed by an inner body which contains a porous dipping element supplying gas in a liquid phase by conveying it by capillarity from the tank, and the other element is formed by a jacket covering the inner body, the inner body having a linear thermal expansion coefficient higher than that of the jacket.

3. A device as claimed in claim 2, characterized in that the inner body and the jacket are anchored to each other at one end thereof remote from the filter.

4. A device as claimed in claims 2 and 3, characterized in that at the end opposite to that at which it is anchored to the inner body, the jacket engages axially an element having a flat face abutting the flat output face of the filter.

5. A device as claimed in claim 4, characterized in that the element abutting the jacket is a nozzle.

6. A device as claimed in claim 5, characterized in that the engagement between the jacket and the nozzle is obtained by means of crimping.

7. A device as claimed in claim 5, characterized in that the engagement between the jacket and the nozzle is obtained by screwing the nozzle in the end of the jacket.

8. A device as claimed in any of claims 2 to 7, characterized in that a washer provided with axial holes is interposed between the filter and the cylindrical body.

9. A method of calibrating a device as claimed in any of claims 4 to 8, characterized in that during the filter compression operation which is carried out at a standard reference temperature, the flow of a fluid is measured which is caused to flow through the filter and the calibrating operation is stopped when the fluid flowing through the filter has a value corresponding to the value of the predetermined gas flow and such as to limit the flame height to the desired value.

10. A method as claimed in claim 9, characterized in that the compression of the filter is obtained by means of a deformation of the jacket.

11. A method as claimed in claim 9, characterized in that the compression of the filter is obtained by screwing on the jacket an element having a flat face abutting the flat output face of the filter.

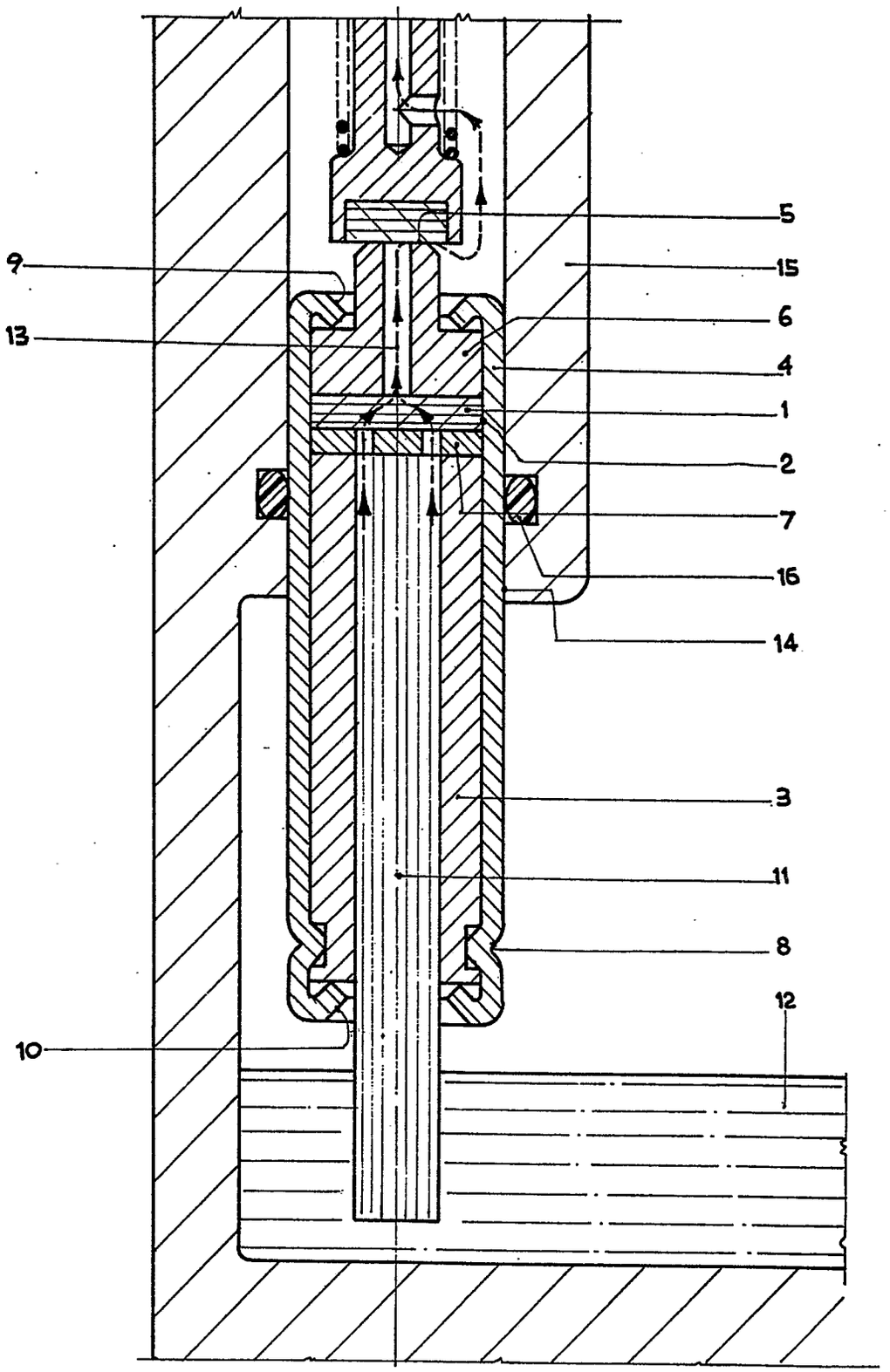

FIG. 1

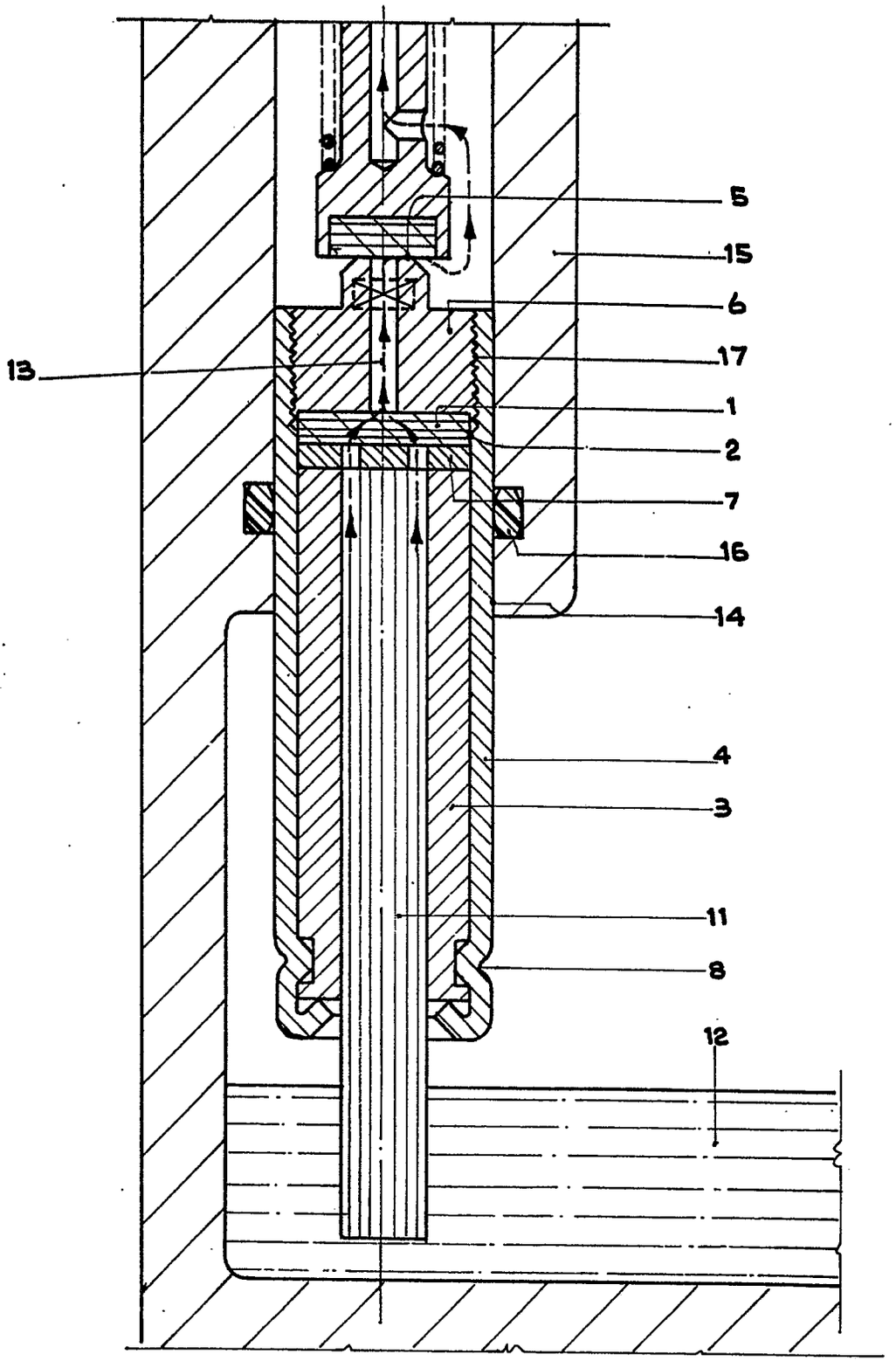

FIG. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application number EP 81 83 0033

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	FR - A - 1 213 250 (ZAHN) * Page 2, left-hand column, paragraph 4; page 3, abstract point 4; figures 1,2 *	1-5
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	FR - A - 2 298 766 (ROWENTA) * Page 5, lines 1-10; figure 1 * & US - A - 4 042 316	1
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A	FR - A - 2 313 639 (GENOUD)	

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

F 23 Q 2/16

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

F 23 Q

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same category
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29-01-1982	VANHEUSDEN