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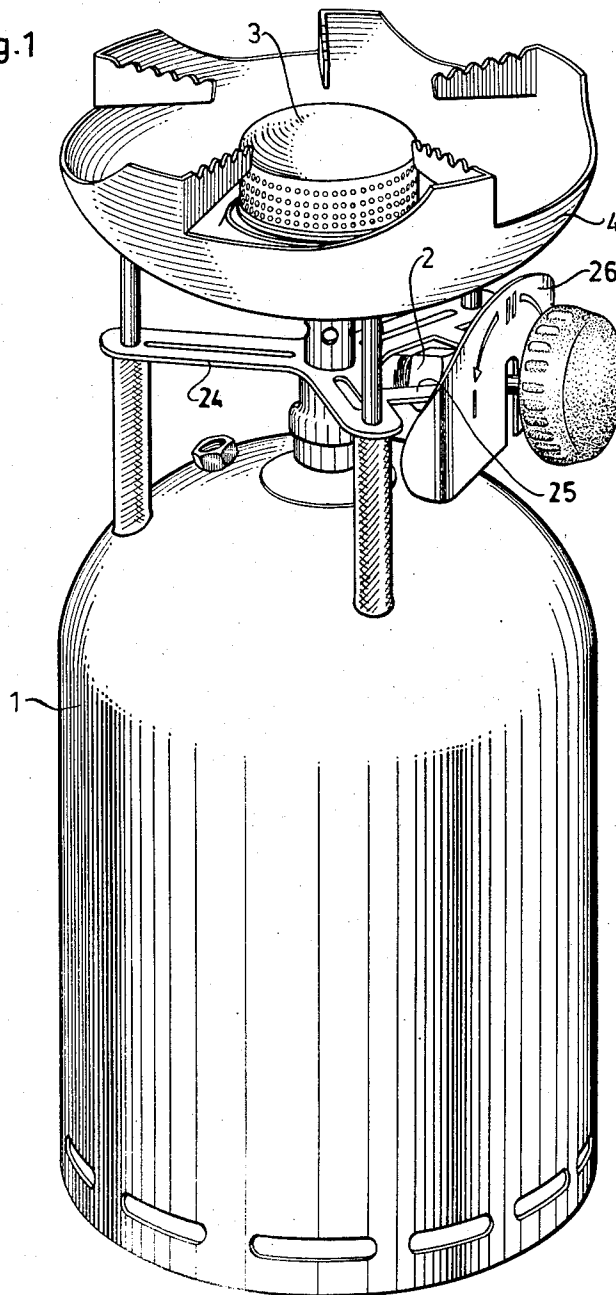
2,851,241

CONTROL VALVES FOR GASEOUS FUEL BURNING APPLIANCES SUCH
AS STOVES, RANGES, HEATERS AND LAMPS

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Fig. 1



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Fig. 2

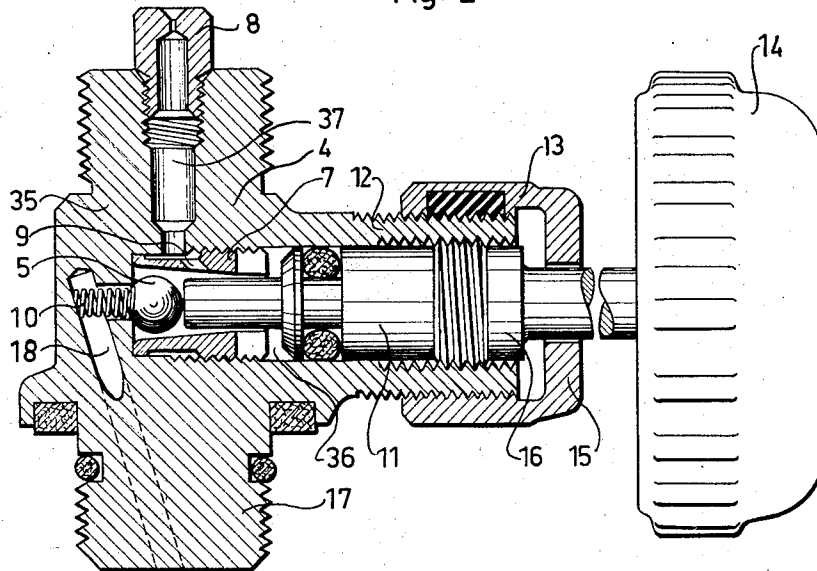
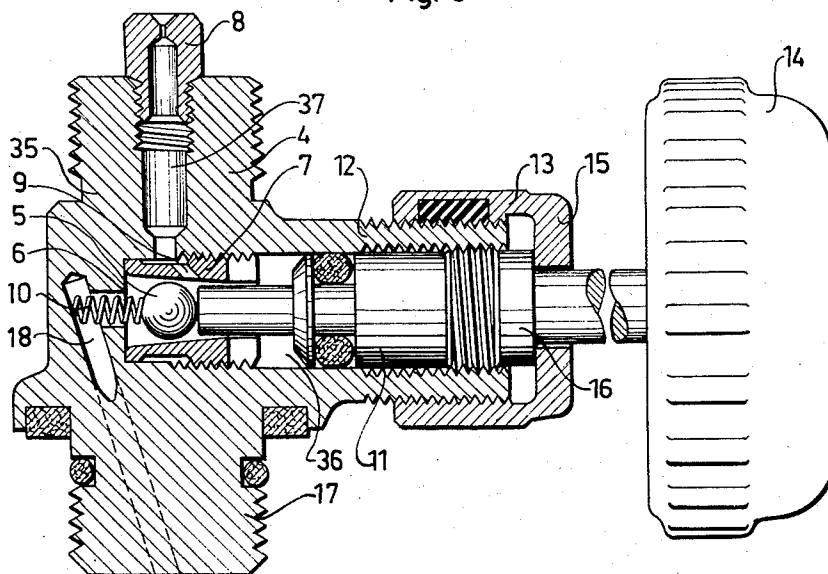


Fig. 3



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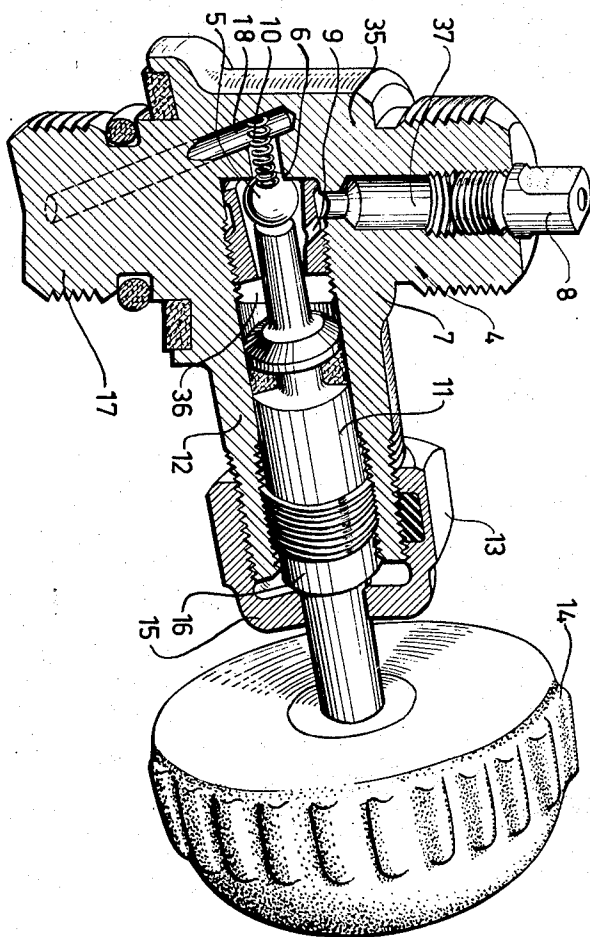


Fig. 4

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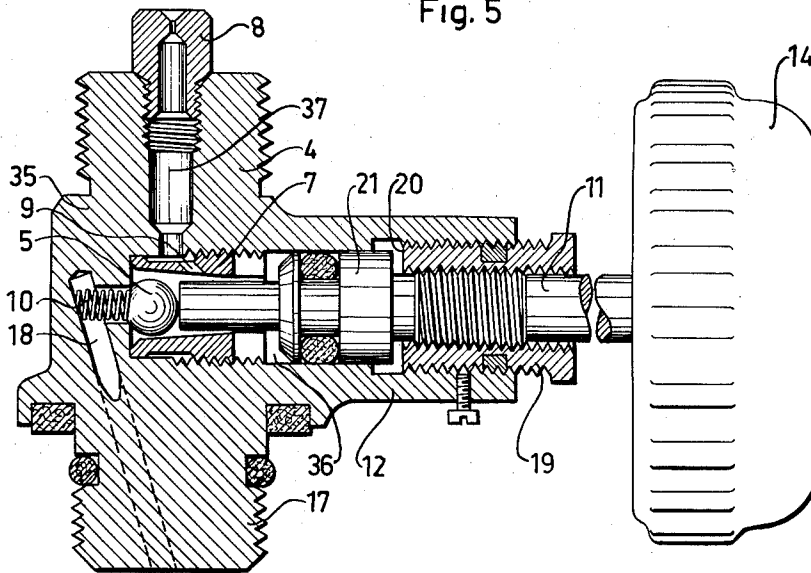
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Fig. 5



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CONTROL VALVES FOR GASEOUS FUEL BURNING APPLIANCES SUCH AS STOVES, RANGES, HEATERS AND LAMPS

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7 Claims. (Cl. 251—121)

The present invention relates to a control valve for gaseous fuel burning appliances such as stoves, ranges, heaters and lamps.

The invention is especially advantageous in connection with small portable stoves as used for instance by campers. With stoves of this kind, it is very important to ration the fuel consumption as economically as possible since the capacity of the fuel container or containers of the stove is rather limited by reasons of weight and size.

Appliances of the general kind herein referred to, are conventionally controlled by needle valves. Such valves are not entirely satisfactory. The used fuel gas is under comparatively high pressure whereby it is difficult to adjust the gas feed to the burner so that the flame has exactly the desired size. Furthermore, the flame of a burner controlled by a needle valve is easily extinguished when and while it is attempted to set the valve for a very small flame.

Accordingly, one of the objects of the present invention is to provide a novel and improved control valve for appliances of the general kind above referred to, which permits conveniently and readily to adjust the burner flame to any desired size.

Another object of the invention is to provide a novel and improved control valve by means of which the flame of the burner can be adjusted to a minimum size without danger of extinguishing the flame while being so adjusted.

Another object of the invention is to provide a novel and improved control valve which permits conveniently and rapidly to adjust the burner flame to a definite minimum size and which further permits to vary said definite minimum size as desired.

A further object of the invention is to provide a novel and improved control valve, the adjustment of which is such that when and while the valve is being adjusted for or toward a minimum flame, the fuel passage of the valve is temporarily fully opened and then gradually and slowly reduced to the desired minimum fuel flow. This affords the advantage that the full gas flow will clean the valve passages thereby assuring an unimpeded passage of the reduced flow of gas which is particularly important for the low gas pressure concomitant with a small flame.

Other and further advantages of the invention will be pointed out hereinafter and set forth in the appended claims forming part of the application.

In the accompanying drawing several preferred embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is an isometric view of a portable stove equipped with a control valve according to the invention.

Fig. 2 is a sectional view of the control valve showing the same in its closed position.

Fig. 3 is a similar sectional view of the valve, but showing the same set for a minimum flame.

Fig. 4 is an isometric sectional view of the valve showing the same in its closed position, and

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Fig. 5 is a sectional view of a modification of the valve showing the same in its closed position.

Referring first to Fig. 1, the stove exemplified in this figure comprises a container 1 holding a body of liquid petroleum gas such as liquid propane, for example, the top of which container supports a burner 3, a cooking vessel support 4 and the control valve according to the invention generally designated by 2.

Turning now to Figs. 2, 3 and 4 showing one of the modifications of the valve, the valve according to these figures comprises a valve casing 35 which includes a generally cylindrical valve chamber 36. This chamber communicates with a gas inlet 18 and a gas outlet 37 ending in a nozzle 8.

The opening and closing of the valve are effected by means of a spherical valve member 5 which in the closed position of the valve is tightly seated upon a seat 6 leading into gas inlet 18. Sphere 5 is movable within a guide sleeve 7 threaded into chamber 36. The inner wall of sleeve 7 defines a frusto-conical space, the wide end of which encompasses valve seat 6. A bore 9 through the narrower part of the frusto-conical space leads to gas outlet 37 and hence to nozzle 8. The diameter of sphere 5 and the configuration of the frusto-conical space within sleeve 7 are so correlated that when sphere 5 has just left its seat by moving toward the right, an annular passage is defined by the sphere and the juxtaposed inner wall portion of sleeve 7 which permits a maximum flow of gas through the valve. As is apparent, a further movement of the sphere toward the right will gradually and slowly reduce the cross-sectional area of the passage until the sphere reaches the end position of Fig. 3 just ahead of bore 9 in which position the cross-sectional area of the passage is at a minimum and just sufficient to sustain a desired minimum flame. In other words, a displacement of sphere 5 from the position of Fig. 2 into the position of Fig. 3 causes a change of the flow of gas from zero value first to a maximum value and then gradually to a predetermined minimum value. Similarly a movement of the sphere from the position of Fig. 3 into the position of Fig. 2 gradually increases the flow of gas from the minimum value to the maximum value and then rapidly reduces the flow of gas from the maximum value to the zero value.

This affords the advantage that due to the gradual reduction of the flow of gas the same can be set accurately and conveniently for a minimum flame without danger of temporarily cutting off entirely the flow of gas thereby extinguishing the flame. Furthermore, the full gas pressure during both the opening and the closing operation of the valve causes a flushing of the valve thereby removing all impurities that may have accumulated therein.

The position of sphere 5 within sleeve 7 is controlled by manually operable control means. These control means are shown as comprising a control rod 11 the inner end of which engages sphere 5 in all positions thereof against the action of a loaded spring 10 which biases the sphere toward engagement with the inner face of rod 11. The rod is screwed into an internally threaded sleeve shaped portion 12 of the valve casing. A cup 13 is threaded upon an external thread of portion 12 and provided with a hole through which rod 11 protrudes. The protruding end of the rod supports a hand wheel 14 or other suitable member for turning rod 11. The bottom 15 of cup 13 forms an abutment for an enlarged portion 16 of the rod thereby limiting the withdrawal of the rod to a position in which sphere 5 occupies a position such that it forms together with the adjacent wall portion of sleeve 7 a very narrow annular passage for the gas which corresponds to the desired minimum flame of the burner. As is apparent, displacement of cup 13 relative to portion 12 varies correspondingly the limit position of the with-

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drawal of rod 11 and as a result the limit position of sphere 5 and with it the minimum size of the flame.

The valve casing is attached to fuel container 1 by means of a threaded stud 17. The gas enters the valve through the gas inlet conduit 18.

When it is desired to increase the minimum flame, cup 13 is screwed deeper upon portion 12 after previously screwing in rod 11 sufficiently to permit the required rotation of cup 13 into its position deeper upon portion 12. Finally, rod 11 is screwed out again into its new limit position to check whether the minimum flame is increased to the desired extent. Similarly, a reduction of the minimum flame is effected by correspondingly screwing out cup 13. The check of the change in the size of the flame is again effected by screwing rod 11 into its new limit position.

Fig. 5 shows a modification which somewhat simplifies the adjustment of the valve.

According to Fig. 5, cup 13 of the previous figures is replaced by a bushing 19 screwed into the threaded extension 12. Bushing 19 serves to receive rod 11 and is internally threaded for this purpose. The inner end of the bushing 19 forms a shoulder 20 engaging a correspondingly enlarged portion 21 of rod 11 when wheel 14 is turned through an angle which corresponds to the setting of bushing 19 and with it of the desired minimum flame. As is apparent, rod 11 is compelled to follow a rotation of bushing 19, when this is adjusted. If the burner is burning while bushing 19 is adjusted, the change of the size of the flame due to the adjustment of bushing 19 can be directly observed.

By selecting the slant of the conical surface in sleeve 7 a very slow variation of the size of the flame from the maximum flame to the minimum flame can be conveniently obtained. Furthermore, as previously pointed out, the very small annular slot determining the size of the gas passage for the minimum flame, which is obviously very sensitive to the presence of dust particles and other impurities collecting in sleeve 7, is cleaned each time by the full pressure of the gas temporarily present when and while sphere 5 moves through the position representing the maximum flame.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A control valve for a gaseous fuel burning appliance, comprising a valve casing including a valve chamber, a fuel inlet and a fuel outlet communicating with said chamber, the wall surface of the casing defining the opening of said inlet within the chamber constituting a valve seat, another wall surface within the casing defining a chamber portion of frusto-conical configuration, said chamber portion encompassing said valve seat at the wide end of said chamber portion and communicating at a narrowed part with said outlet, a spherical valve member freely movable within said frusto-conical chamber portion and having a diameter less than the maximum diameter of said frusto-conical portion, and control means coacting with said valve member for limiting movement of the latter between a closing position in which the valve member is seated upon said valve seat and a predetermined minimum flow position, said latter position being a position anterior of the point at which said chamber portion communicates with the outlet whereby upon movement of the valve member from its closing position toward its minimum flow position the fuel flow becomes first a maximum and is gradually reduced to the minimum flow, said control means comprising an axially

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displaceable control rod extending through the narrow end of said frusto-conical chamber portion into engagement with the valve member and stop means positively limiting an outward displacement of the rod relative to the valve seat to the position in which said valve member occupies the minimum flow position, said stop means including shoulders on the rod and the valve casing respectively engageable with each other to arrest further outward displacement of the rod.

2. A control valve according to claim 1, wherein one of said shoulders is axially displaceable.

3. A control valve according to claim 1, wherein said stop means comprise a sleeve threaded in the valve casing and forming the shoulder in the casing, said sleeve having an internal thread for receiving the correspondingly threaded control rod.

4. A control valve for a gaseous fuel burning appliance, said valve comprising a valve casing including a valve chamber, a fuel inlet and a fuel outlet for the passage of fuel through said chamber, the wall surface of said casing defining said inlet constituting a valve seat, a guide sleeve fitted in said chamber, the interior of said sleeve communicating with said gas outlet, the inner wall of said sleeve defining a conical surface inwardly tapered continuously from said seat toward said outlet, the wide end of said conical surface circumscribing said valve seat, a spherical valve closure member freely axially movable within said sleeve, said closure member coacting with said seat and having a diameter less than the diameter at the wide end of said conical surface, but larger than the diameter of the narrow end of the conical surface, a control rod rotatably disposed in said casing for axially displacing said rod by rotating the same, said rod extending into said sleeve from the narrow end thereof and coacting with said closure member for positively limiting the innermost position of the said member within the sleeve relative to the narrow end thereof by the axial position of said rod, spring means urging the closure member continually into abutment with the end of the rod in the sleeve, and axially adjustable stop means mounted on the casing and engageable with said rod for positively limiting the withdrawal thereof from the sleeve to a selected outer end position whereby upon withdrawal of the rod from the position holding the closure member against its seat toward and into said end position the passage area for the gas through the sleeve first increases rapidly to a maximum and then decreases slowly and gradually to a minimum in said end position of the closure member due to the decreasing differential between the diameters of the conical surface and the closure member respectively.

5. A control valve according to claim 4, wherein said adjustable stop means comprise an abutment member supported by the casing and displaceable parallel to the rod movement and a shoulder on the rod engageable with said abutment member to limit the withdrawal of the rod at said end position.

6. A control valve according to claim 4, wherein said adjustable stop means comprise a setting sleeve fitted in the casing axially adjustable relative thereto and receiving the rod axially adjustable relative to the sleeve for selectively displacing the setting sleeve jointly with the rod to vary the selected end position of the rod and displacing the rod relative to the setting sleeve to move the rod into said end position, said rod having a shoulder thereon engageable with said setting sleeve to arrest the rod in said end position.

7. A control valve according to claim 4, wherein said adjustable stop means comprise an externally and internally threaded setting sleeve threaded into the casing coaxially with said rod and receiving the rod for selectively displacing the setting sleeve jointly with the rod to vary the selected end position of the rod and displacing the rod relative to the setting sleeve to move the rod into the end position, said rod having a shoulder thereon engage-

able with said setting sleeve to arrest the rod in said end position.

References Cited in the file of this patent

UNITED STATES PATENTS

692,808	Wemmer	Feb. 4, 1902	1,842,902
750,539	Hiller	Jan. 26, 1904	1,989,870
1,582,938	Smith	May 4, 1926	2,010,088
1,835,020	Forest	Dec. 8, 1931	2,098,583
			2,170,922
			2,255,929
			2,497,635

5

10

Faber	Jan. 26, 1932
Lafferty	Feb. 5, 1935
Kohler	Aug. 6, 1935
Kleinsmith	Nov. 9, 1937
Harr	Aug. 29, 1939
Huston	Sept. 16, 1941
Stevens	Feb. 14, 1950

FOREIGN PATENTS

Great Britain	Feb. 13, 1919
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