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LaGanke

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[45] **June 25, 1974**

[54] **AIR FLOW CONTROL VALVE**

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[52] **U.S. Cl.** **137/604,** 251/145, 251/287, 251/310, 431/354

[51] **Int. Cl.** **F16k 11/02**

[58] **Field of Search** 251/145, 147, 287, 310, 251/345, 182; 137/625.41, 604; 431/354

[56] **References Cited**

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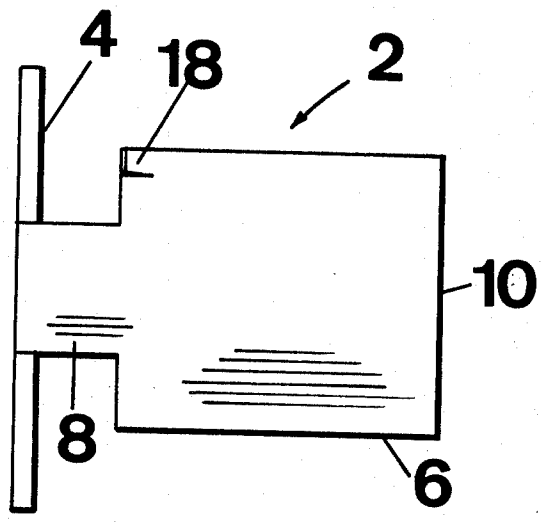
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Primary Examiner—William R. Cline

[57] **ABSTRACT**

An adjustable air flow control valve is provided for a gas burner or other fuel burning apparatus. The valve is located at the end of a pipe in which the fuel is flowing. The pipe has at least one air inlet opening in its side, and the valve has an end plate extending across the end of the pipe and two resilient flanges extending into the pipe. At least one of the flanges is positioned so that it can close the air inlet opening. The flanges fit snugly against the inside wall of the pipe and permit rotation of the valve to various positions in which the air inlet opening is fully closed, partially closed, or open.

7 Claims, 4 Drawing Figures



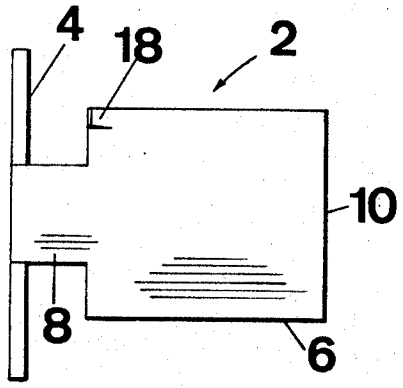


Fig. 1

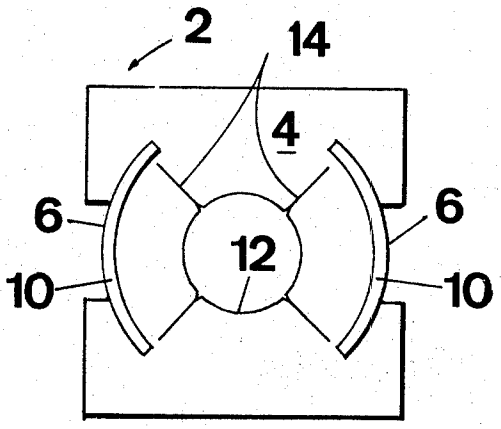


Fig. 2

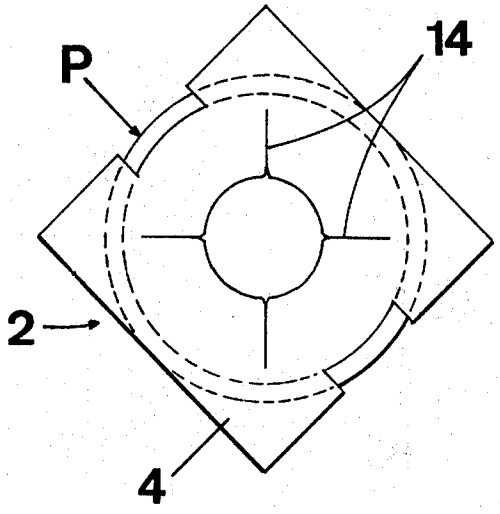


Fig. 3

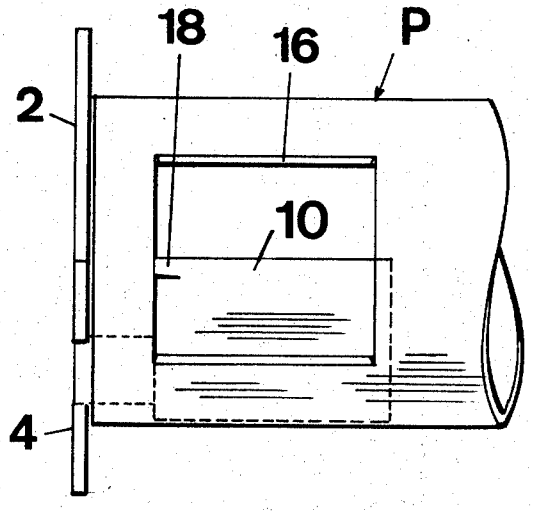


Fig. 4

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AIR FLOW CONTROL VALVE

DESCRIPTION OF THE INVENTION

My invention relates to an adjustable air flow control valve for a gas burner or other fuel burning apparatus. The most common application of this valve is for controlling the air flow in a typical gas burner such as is used in the oven of a gas cooking range.

A common problem with past air flow control valves for gas burners has been its adjustability. It is necessary to make the valve adjustable so that a person can set the desired air flow or fuel/air ratio for the burner. However, once the valve is set in its desired position, it must stay in place, or else it will need to be readjusted constantly and will become a source of great nuisance.

Prior air flow control valves have suffered from at least one of several deficiencies. Some have been too difficult to adjust, while others do not stay in position once they are adjusted. Also, many are rather expensive to manufacture.

A number of air flow control valves use set screws that must be loosened and then retightened when they are adjusted. Examples of these are shown in U.S. Pat. No. 1,138,416 (Roberts and Butler) and U.S. Pat. No. 2,839,080 (Copeland). The Roberts and Butler patent shows an air flow control end plate with a set screw that holds the end plate in various positions of rotation and air flow opening. The Copeland patent shows a ring-shaped air flow control valve that fits around a fuel burner pipe. A set screw ties together the two ends of the ring-shaped valve and holds the valve on the pipe in various positions of air flow opening. The problems with both the Copeland and the Roberts and Butler valves are that they are more expensive than necessary and they require a screwdriver for adjustment. Often, these valves are located in places that are difficult to reach with a screwdriver. Also, many valves such as the Roberts and Butler valve serve the additional function of holding the gas nozzle for the burner. A set screw on one side of such a valve tends to tilt the valve and the nozzle relative to the axis of the pipe. Such tilting of the nozzle causes the gas flowing through the burner to burn poorly and unevenly.

Some air flow control valves are simpler than those shown in the foregoing patents. They consist of a split collar that has a diameter slightly less than the outside diameter of the burner pipe. The two sides of the collar are pulled outwardly to make them fit around the outside of the pipe. The problem with this collar is that it either fits too tightly and is extremely difficult to move to adjust the air flow, or it fits too loosely and needs adjustment too frequently. Also, while this type of valve is not too expensive by itself, it does not serve the function many valves do of covering the annular space around the gas nozzle at the end of the burner pipe. Thus, when a split collar type of valve is used, an additional forming operation is required to curl the end of the pipe inwardly to meet the periphery of the gas nozzle. With larger diameter pipes, this forming operation is difficult or impossible, and a separate end plate must be provided over the end of the pipe. With either the end plate or the forming operation, an expensive cost item is added to the manufacture of the end product.

One object of my invention, therefore, is to provide an inexpensive air flow control valve for a fuel burner that is easy to adjust without wrenches, screwdrivers, or other tools, but once adjusted, stays permanently in position.

Another object of my invention is to provide an easily adjustable, inexpensive air flow control valve that includes an end plate with a hole for receiving a gas nozzle, thereby eliminating the need for a separate end plate or forming operation on the end of the burner pipe.

Still another object of my invention is to provide an air flow control valve for a fuel burner that does not rely on set screws that tend to tilt the valve relative to the pipe and cause misalignment of the fuel nozzle held by the valve.

These and other objects obtained by my invention will appear more readily from the following detailed description of my invention and the attached sheet of drawings, in which:

FIG. **1** is a side view of an air flow control valve embodying my invention;

FIG. **2** is an end view of the air flow control valve of FIG. **1**;

FIG. **3** is an end view of the air flow control valve of FIG. **1** inserted in a gas burner pipe; and

FIG. **4** is a side view of the air flow control valve and gas burner pipe of FIG. **3**.

Referring to FIGS. **1** and **2**, the air flow control valve **2** has an end plate **4**, with two flanges **6** bent substantially perpendicular to the end plate. Each of the flanges **6** has a neck **8** and a curved shutter portion **10**. The valve **2** is preferrably stamped from metal, so that when an external force is applied to the flanges **6**, they will tend to resist such force with a spring-like resiliency. However, one may substitute equivalent materials exhibiting this same characteristic.

In the center of end plate **4** is a hole **12**, and slits **14** extend radially from the hole **12**. Normally, a nozzle for the gas or other fuel to be burned is inserted through the hole **12** with a sliding fit. This nozzle is inserted from the left side of plate **4** as viewed in FIG. **1**, but is not shown in the drawings since it is not part of my invention. The slits **14** are often desireable to insure a better sliding fit around the gas nozzle, but they are not necessary.

As shown in FIGS. **3** and **4**, the flanges **6** of valve **2** are inserted through the end of a pipe P. The curved shutter portions **10** of the flanges **6** are pressed slightly toward each other before being inserted in the pipe P, so that after being inserted, they will spring outwardly into a snug fit against the inside wall of pipe P. By using this construction, the flanges **6** hold the valve **2** in a fixed position in the pipe P, yet they allow a person to rotate the valve **2** to another fixed position by an easy turning of the end plate **4**.

The shutter portions **10** of the flanges **4** are sized and located so they can close or open air inlet openings **16** in the pipe P. Thus, by rotating the end plate **4**, one can vary the amount by which the shutter portions **10** close or open the air inlet openings **16**. A small protrusion **18** (FIG. **4**) is formed by cutting into one of the shutter portions **10**, and bending a small piece of the shutter portion outwardly. The protrusion **18** bears against the upper and lower edges of the opening **16** (as viewed in FIG. **4**) to limit the rotation of the valve **2** between positions in which the air inlet openings **16** are substan-

tially closed, or open to the fullest extent desired. At the same time, the protrusion **18** bears against the left-hand edge of opening **16** (as viewed in FIG. **4**), so that the valve **2** is prevented from being pulled out of the pipe P by accident.

If for any reason, one desires to remove the valve **2** from the pipe P, he may do so simply by pressing the shutter portions **10** of the flanges **6** toward each other enough to release the protrusion **18** from bearing against the edge of the air inlet opening **16.** Then, the valve **2** may be easily pulled from the end of pipe P.

In summary, I have provided an air flow control valve **2** with resilient flanges **6** that fit inside, rather than outside, the gas pipe P. These flanges hold the valve securely in any position of air flow opening, yet they permit the valve to be easily adjusted to another position when desired. In addition, the valve is of a very simple construction and is less costly to manufacture than most prior valve designs. No costly forming operations or end plates are required to close off the end of the pipe, because the end plate **4** of the valve **2** does this job. Also, my invention uses no set screws which tend to misalign the valve and gas nozzle held therein.

While I have shown and described only one embodiment of my invention, modifications and additions may of course be made without departing from the scope of the following claims:

I claim:

1. An adjustable air flow control means for a fuel burning apparatus, comprising,

a. a pipe for conveying fuel, said pipe having a cylindrical sidewall with at least one air inlet opening and provided with an inlet opening for said fuel and an outlet opening for said fuel and air, and

b. a valve having

1. an end plate extending across the end of said pipe and perpendicular to the axis of said pipe, and

2. two flanges of resilient material bent from opposite sides of said end plate so as to be substantially perpendicular thereto, said flanges extending into the interior of said pipe adjacent opposite sides of said sidewall and springing outwardly into a snug fit against said sidewall so as to hold said valve in a fixed position in said pipe, yet permitting said valve to be rotated by a positively applied external force to other fixed positions, at least one of said flanges extending across said air inlet opening to varying degrees of closing or opening in the different positions of rotation of said valve.

2. The air flow control means of claim **1** wherein one of said flanges has a protrusion which bears against one side of said air inlet opening when said flange substantially closes said opening and which bears against an opposite side of said opening when said flange uncovers said opening to the fullest extent desired, said protrusion thereby limiting the rotation of said valve to positions between that of substantially closing said air inlet opening and that of opening said air inlet opening to the fullest extent desired.

3. Apparatus of claim **2** in which said protrusion continuously bears against a third side of said opening to prevent said valve from being pulled out of said pipe by accident.

4. Apparatus of claim **1** wherein said end plate of said valve has an opening for allowing the passage of fuel therethrough.

5. A valve for adjusting the size of an air inlet opening in a cylindrical fuel and air mixing pipe of a fuel burning apparatus, said valve comprising,

1. an end plate with an opening for allowing the passage of fuel therethrough, and

2. two flanges of resilient material bent from opposite sides of said end plate so as to be substantially perpendicular thereto, said flanges being spaced apart the correct distance to fit into said fuel and air mixing pipe and spring outwardly into a snug fit against said pipe while permitting said valve to be rotated by a positively applied external force, at least one of said flanges being of a length such that when said end plate is placed against the end of said pipe, said flange extends across said air inlet opening to varying degrees of closing or opening in the different positions of rotation of said valve.

6. The valve of claim **5** wherein one of said flanges has a protrusion positioned to bear against one side of said opening when said flange substantially closes said opening and to bear against an opposite side of said opening when said flange uncovers said opening to the fullest extent desired, said protrusion thereby limiting the rotation of said valve to positions between that of substantially closing said opening and that of uncovering said opening to the fullest extent desired.

7. The valve of claim **6** in which said protrusion is positioned to continuously bear against a third side of said opening to prevent said valve from being pulled out of said pipe by accident.

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