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Improved safety switch structure for a gas burner

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to an improved safety switch structure for a gas burner, and more particularly to a safety switch structure with minimized size and with the gas passage having the function of regulating output gas amount.

2. Description of the prior art

Since the gas burner was invented, gas has become most convenient fuel for cooking. The fire can be easily ignited only to rotate the rotary knob of a gas burner, a hard work for collecting and storing the fuel such as wood, coal or charcoal as experienced in the past has no more can be encountered in the present days.

The Fig. 1 shows a cross sectional view of a conventional safety switch structure for a gas burner, the enclosure of a gas burner safety switch 1 mainly comprises a safety switch unit 10 and an electro magnetic valve assembly 11, wherein, there is a rotating shaft 15 extending its one end from said enclosure and adapting to a gas rotary knob 12, while the other end of the rotating shaft is figured into a crossed claw to clamp one end of a cock rod 13 where a cock 14 is provided and sticking around the cock rod 13. By rotating the cock rod 13, cock 14 is driven to rotate too which make a gas inlet 1A and a gas outlet 1B become partially or fully communicable. One end of the cock rod 13 is closely in contact with the rotary shaft 11, while the other end is in contact with one end of the electro magnetic valve assembly 11 for pushing it out of operation when it is necessary. The electro magnetic valve assembly 11 lies in its longitudinal direction along the length of the cock rod 13 resulting in the following disadvantages;

1. As the size of the safety switch is large, it is space wasting which will not fulfil the requirement of compactness in present trends, and moreover, such a bulky size is inconvenient for handling, assembling, and transporting.
2. A larger size will, of course, occupy a broader space which leads to the necessary of larger warehouse for storing the products and results in increased storage cost.
3. There is no mechanism for regulation of the amount of different gases provided in the gas passage between inlet and outlet. In case the conversion of fuel source is to be made between natural gas (fuel value 8900 kcal/hour) and propane gas (fuel value 28105 kcal/hour), a new cock with proper guide hole diameter to the new gas source shall be chosen to replace the old one. Such a procedure is not only tiresome, but also hazardous to cause gas leakage in case the quality of new cock is not dependable. An additional installation for a new mechanism to regulate the gas amount is intangible because the gas outlet is so far from the cock in the conventional installation.

In order to rectify the above described disadvantages encountered in the conventional gas burner safety switches, the applicant, through a long time study and trial, finally succeeded in developing an improved safety switch structure for a gas burner and will be disclosed hereinafter.

SUMMARY OF THE INVENTION

It is a first object of the present invention to provide an improved safety switch structure for a gas burner with minimized length in its body for the conventional of production, assembly, handling and transportation.

It is a second object of the present invention to provide an improved safety switch structure for a gas burner with minimized entire size of its safety switch so as to increase the storage rate of the product per unit area in warehouse and improve the space availability in the factory.

It is a third object of the present invention to provide an improved safety

switch structure for a gas burner whose gas amount in the gas passage in the safety switch unit can be easily regulated.

To achieve these and other objects, the electro magnetic valve assembly stands vertically in its longitudinal direction near the cock rod, and extends an operation rod from the rear of the cock rod, one side of the operation rod is formed into an upside down clamp figure to clamp and fix the electro magnetic valve assembly. Approximately at the middle portion from the two sides of the operation rod is interconnected with an axis and hinged to the inner wall of the safety switch enclosure. The two rod arms are nearly connected in right angle so that the length of the safety switch unit is minimized.

As the electro magnetic valve assembly is standing vertically in its longitudinal direction near the cock rod, the size of entire safety switch unit is minimized, the object of increasing the storage capacity of the product per unit area in the warehouse and improving the space availability in the factory may be achieved.

Further to this, minimized size of the safety switch unit brings the result that the electro magnetic valve assembly to become approaching closer to the gas outlet which in turn approaches closer to the cock, thus the object of easily regulating the gas amount in the gas passage in the safety switch unit can be achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, as well as its many advantages, may be further understood by the following detailed description and drawings in which:

Fig. 1 is a cross sectional view of a safety switch structure for a conventional gas burner;

Fig. 2 is a three dimensional view of the improved safety switch structure for a gas burner according to the present invention;

Fig. 3 is a cross sectional view of the improved safety switch structure for a gas burner according to the present invention;

Fig. 4 is a drawing illustrating the operation of the improved safety switch structure for a gas burner according to the present invention;

Fig. 5 is a partial cross sectional view of the improved safety switch structure for a gas burner according to the present invention; and

Figs. 6A through 6E are drawings illustrating the different communicable routes for gas passage corresponding to each rotated cock position with respect to the inner enclosure wall of the safety switch structure for a gas burner according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The safety switch structure for a conventional gas burner shown in Fig. 1 together with its disadvantages has been fully described and will not be repeated herein.

Referring to Fig. 2 and 3, showing a three dimensional view and a cross sectional view of the improved safety switch structure for a gas burner according to the present invention respectively, it is understood that the structure comprises mainly a safety switch unit 200 and an electro magnetic valve assembly 300 in a switch enclosure 100, wherein one end of a rotating shaft 201 in the safety switch unit 200 is extended out of the enclosure 100 to engage with a rotary gas knob 400; while the other end is formed into a crossed claw figure to engage with one end of a cock rod 202. A cock 203 is circularly adapted around the outer circumference of the cock rod 202. By the rotation of the cock rod 202, the cock 23 is driven to connect a gas inlet 102 and gas outlets 103, 104 in the enclosure 100 partially communicable. One end of the cock rod 202 other than the end closely nearby the rotating shaft 201 is forcibly in contact with a operating rod 204 to form the entire safety switch unit 200. The end of the operating rod 204 other than the end where it is in contact with the cock 203 is made contacting to one end of the electro magnetic valve assembly 300 and can forcibly drive and de-energize the valve assembly 300 when necessary. The electro magnetic valve assembly 300 stands vertically in its longitudinal direction near the cock rod 202.

One side of the operation rod 204 is formed into an upside down clamp figure to clamp and fix the electro magnetic valve assembly 300. Approximately at the middle portion form the two sides of the rod 204 is interconnected with an axis and hinged to the inner wall of the safety switch enclosure 100. The two rod arms 204B, 204C are approximately crossed in right angle so that the length of the safety switch unit 200 is minimized.

As shown in Fig. 4, when the rotary knob 400 is rotated, the rotating shaft 201 coupled with the rotary knob 400 is driven to rotate and engage with one end of the cock rod 202 so that the cock rod 202 is pushed to slide out of a main passage 203A of the cock 203 and actuate the operation rod 204 from the end where it is contacting with the cock rod 202. Then the operation rod 204 is actuated to rotate with respect to the hinged place 204A as the rotating center. Since the operation rod 204 is formed into an upside down clamp figure, it in turns rotates the clamped electro magnetic valve assembly 300 to de-energize it. With such a mechanism the size of the safety switch unit is minimized to achieve the object of increasing the storage capacity of the product per unit area in the warehouse and improving the space availability in the factory.

The present invention may also be embodied in the form as shown in a partial cross sectional view of the safety switch structure of Fig. 5, wherein a threaded hole 101 is provided along the length of the cock rod 202, at the side of a conduit with cock 203 installed therein, from the enclosure 100 to the end surface of the rotary knob 400. The depth of threaded hole 101 reaches the bottom of the gas outlet 104 close to the electro magnetic valve assembly 300. In said threaded hole 101, there are further provided a first penetrating hole 101A reaching the gas outlet 104, and a second penetrating hole 101B reaching an opening of the cock 203 respectively. A conical screw with an acute point 110 covered with an air tight coat 110A is inserted into the threaded hole 101. The size of the opening of the conduit between the first and the second penetrating holes 101A and 101B is determined by the insertion depth of the conical screw 110 in the threaded hole 101. The function of regulating the gas flow in the gas passage in the safety switch unit is provided by such mechanism.

The different communicable routes for gas passage corresponding to each rotated cock 203 position with respect to the inner enclosure wall of the safety

switch unit 200 for a gas burner according to the present invention can be understood from the Figs. 6A through 6E. A main passage 203A provided at the center of the cock 203 leads to the gas inlet 102. An inner circular gas orifice 203B, an outer circular gas orifice 203C and a let-through hole 203D are respectively provided at the appropriate position on the wall of cock 203. The main passage 203A may reach the inner gas outlet 104 via inner circular gas orifice 203 B; while the main passage 203A may reach the outer gas outlet 103 via outer circular gas orifice 203C. The main passage 203A may also reach the second penetrating hole 101B via let-through hole 203D. As shown in Fig. 6A, before rotating the cock 203, the inner circular gas orifice 203B, outer circular gas orifice 203C, and the let-through hole 203D are not communicable to outer gas outlet 103, inner gas outlet 104 and the second penetrating hole 101B respectively so that the gas staying in the main passage 203A can not flow out.

As shown in Fig. 6B, when the cock 203 is rotated 60° to the right, it becomes communicable partially in a defined small range between the outer circular gas orifice 203C and the outer gas outlet 103, and also samething as between the inner circular gas orifice 203B and the inner gas outlet 104. At this moment it is not yet communicable between the let-through hole 203D and the second penetrating hole 101B so that a small amount of gas may flow to both the outer gas outlet 103 and inner gas outlet 104 to ignite the gas burner both on its inner and outer gas outlets.

As shown in Fig. 6C, when the cock 203 is rotated 90° to the right, it becomes entirely communicable between the outer circular gas orifice 203C and the outer gas outlet 103; and also samething as between the inner circular gas orifice 203B and the inner gas outlet 104, but at this moment it is still not communicable between the let-through hole 203D and the second penetrating hole 101B so that a large amount of gas may flow to both inner and the outer gas outlet 104 and 103 to fire the gas burner intensively.

As shown in Fig. 6D, when the cock 203 is rotated 120° to the right, it becomes partially communicable in a defined small range between the outer circular gas orifice 203C and the outer gas outlet 103, and also samething as between the inner circular gas orifice 203B and the inner gas outlet 104, at this moment, it becomes partially communicable in a defined small range between

the let-through hole 203D and the second penetrating hole 101B, and as shown in Fig. 5, the controlled amount of gas by the conical screw 110 inserted in the threaded hole 101 flows out of the inner gas outlet 104 via the first penetrating hole 101A, and a small amount of gas may also flow out of the outer gas outlet 103 so that the gas burner may be ignited fairly both on its inner and outer gas outlets. In this case since the ignition state at the inner circle is affected by the amount of gas passing through the first penetrating hole 101A, the intensity of fire can be regulated freely.

As shown in Fig. 6E, if the cock 203 is rotated 140° , it becomes not communicable between the outer circular gas orifice 203C and the outer gas outlet 103 and also not communicable between the inner circular gas orifice 203B and the inner gas outlet 104, then at this moment it becomes communicable all the way between the let-through hole 203D and the second penetrating hole 101B so that the outer gas outlet 103 is closed to quench the fire; while in the inner circle the intensity of fire may be adjustable to any degree.

As described above, the improved safety switch structure for a gas burner according to the present invention is able to minimized the size of entire unit and increase the storage capacity of the product per unit area in the warehouse and improve the space availability in the factory, minimized size of the unit also brings the result of facilitating regulation of gas amount in the gas passage in the safety switch unit.

As described above, the present invention is not limited to the above embodiment, and it is clearly understood that many variations can be made within the scope and sprit of the present invention by any one skilled in the art.

What is claimed is:

1. An improved safety switch structure for a gas burner mainly comprises a safety switch unit and an electro magnetic valve assembly in a switch enclosure, wherein one end of a rotating shaft in said safety switch unit being extended out of said enclosure to engage with a rotary gas knob; while the other end being formed into a cross claw figure to engage with one end of a cock rod, a cock being circularly adapted around the outer circumference of said cock rod, by the rotation of said cock rod, the cock being driven to connect a gas inlet and gas outlets 103, 104 in said enclosure partially communicable, one end of said cock rod other than the end closely nearby said rotating shaft being forcibly in contact with a operating rod to form said entire safety switch unit, the end of said operating rod other than the end where it being in contact with said cock being contacted to one end of said electro magnetic valve assembly and being able to forcibly drive and de-energize said valve assembly when necessary.
2. The improved safety switch structure of a gas burner as claimed in claim 1, wherein said electro magnetic valve assembly stands vertically in its longitudinal direction near said cock rod, one side of said operation rod being formed into an upside down clamp figure to clamp and fix said electro magnetic valve assembly, approximately at the middle portion from the two sides of said operation rod being interconnected with an axis and hinged to the inner wall of said safety switch enclosure, the twp halves of said operation rod 204B, 204C being approximately crossed in right angle to clamp and hold one end of said electro magnetic valve assembly and press said cock rod with the other end.
3. The improved safety switch structure for a gas burner as claimed in claim 1, wherein a threaded hole is provided along the length of said cock rod, at the said of a conduit with said cock installed therein, from said enclosure to the end surface of said rotary knob, the depth of said threaded hole reaching the bottom of the inner gas outlet close to said electro magnetic valve assembly, in said threaded hole there being further provided a first penetrating hole reaching the inner gas outlet; and a second penetrating hole an opening of said cock respectively, a conical screw with an acute point covered with an air tight

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coat being inserted into said threaded hole, the size of the opening of said conduit between said first and said second penetrating holes being determined by the insertion depth of said conical screw in said threaded hole for providing the function of regulating the gas flow in the gas passage in the safety switch unit.

4. The improved safety switch structure for a gas burner as claimed in claim 1, wherein said main passage provided at the center of said cock leads to the gas inlet, an inner circular gas orifice, an outer circular gas orifice and a let-through hole being respectively provided at the appropriate position on the wall of said cock, said main passage being able to reach the inner gas outlet via inner circular gas orifice; while said main passage being able to reach the outer gas outlet via outer circular gas orifice, and said main passage also being able to reach second penetrating hole via said let-through hole.

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