Aug. 29, 1950 S. S. MINNICH 2,520,608

CONCUSSION RELIEF HOOD FOR FLASH TUBES

Filed April 5, 1945 2 Sheets-Sheet 1

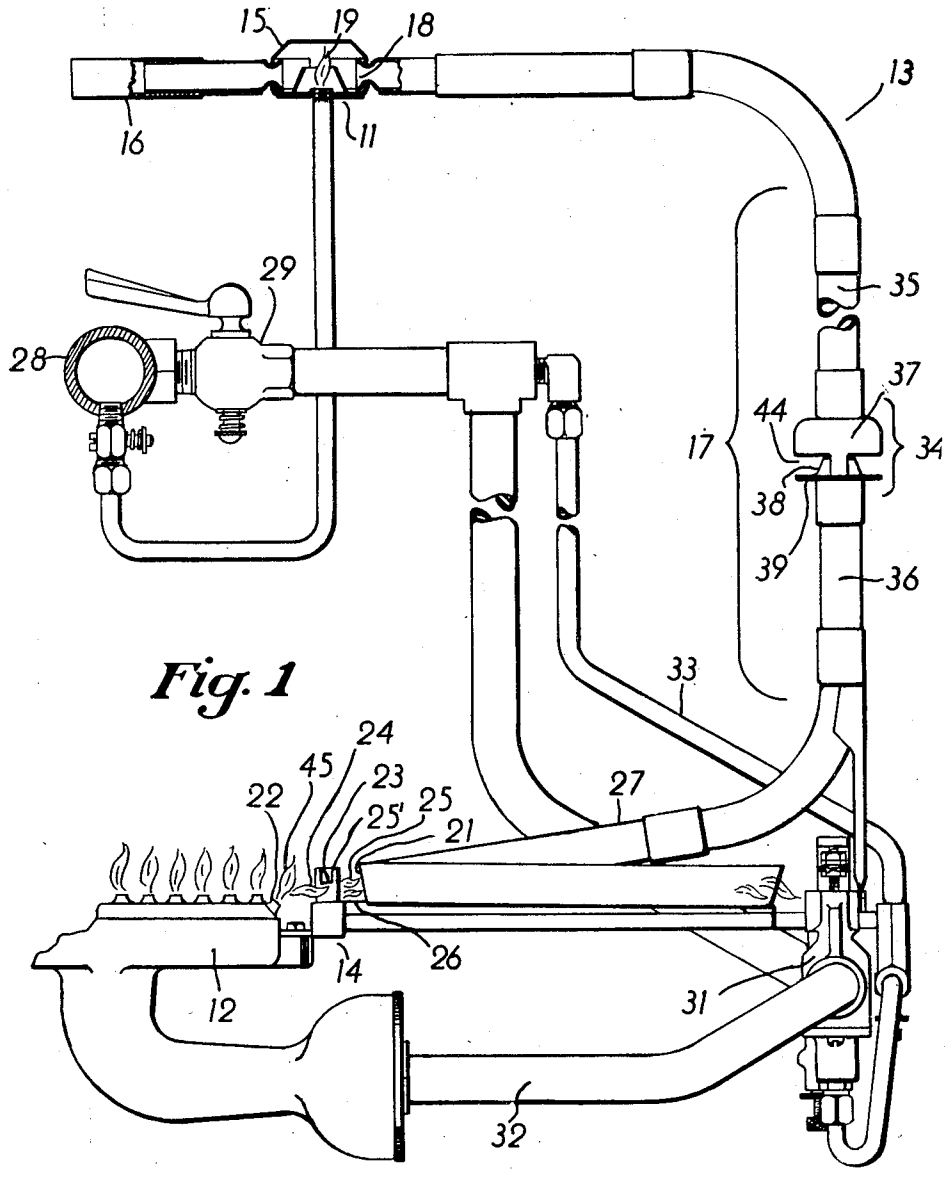



Fig. 1

Stehman S. Minnich INVENTOR.

BY Frederic B. Scheaman

Atty

Aug. 29, 1950 S. S. MINNICH 2,520,608

CONCUSSION RELIEF HOOD FOR FLASH TUBES

Filed April 5, 1945 2 Sheets-Sheet 2

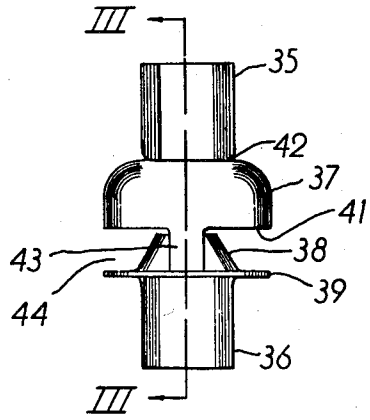



Fig. 2

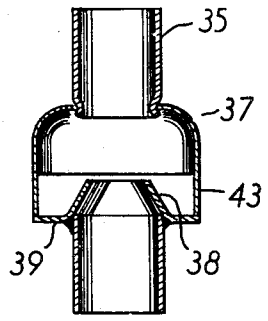



Fig. 3

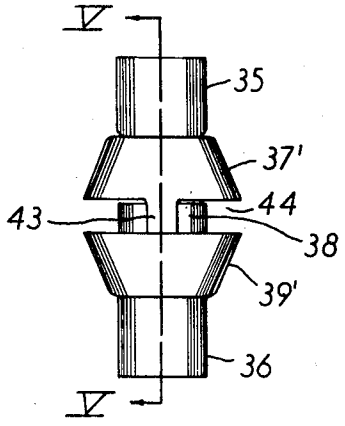



Fig. 4

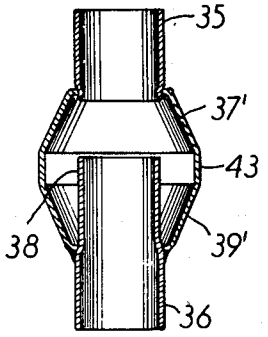



Fig. 5

Stehman S. Minnich INVENTOR.

BY Frederic B. Schramm

Atty

Patented Aug. 29, 1950 2,520,608

# UNITED STATES PATENT OFFICE

2,520,608

## CONCUSSION RELIEF HOOD FOR FLASH TUBES

Stehman S. Minnich, Cleveland, Ohio, assignor to The Patrol Valve Company, Cleveland, Ohio, a corporation of Ohio

Application April 5, 1945, Serial No. 586,763

8 Claims. (Cl. 158—115)

1

My invention relates to flash lighters for gaseous fuel burners and has for its principal object the provision of methods and apparatus for improving flashing action.

For the purpose of enabling gaseous fuel equipment such as kitchen ranges and gas water heaters for example to be ignited automatically when the gas is turned on to the main burner, pilot lights have been employed. In order to ignite the main burner from the pilot flame, tubes known as flash tubes have been provided which cause gas to be transferred from the main burner to the pilot flame and to cause a flame to be flashed back from the pilot burner through the flash tube to the main burner for igniting it. Proper flashing action and reliability of action in flash tubes heretofore employed depend upon the proper adjustment of the flash tube and proportioning of the parts thereof.

In an apparatus where a single constant-burning pilot is to be employed for use of burners situated some distance apart as in cooking ranges, for example, where the top range burners as well as the oven and broiler are to be ignited from the same constant pilot, it becomes necessary to employ a relatively long flash tube, usually having a vertical section therein. The presence of such a flash tube increases the necessity for great nicety of adjustment and also makes it difficult to obtain an adjustment which will be satisfactory at all temperatures which may be encountered.

It is accordingly an object of my invention to provide means for enabling either vertical or relatively long flash tubes to be employed successfully and without the employment of great skill in adjustment of the apparatus.

A further object is to provide reliability and uniformity of action, and to make the operation of the flash tube independent of ambient temperature as well as independent of variations in temperature of the tube.

A further object is to avoid the necessity for employing different adjustments for different temperatures.

A further object is to avoid excessive tube temperatures. It is also an object to provide a construction which will enable the flame to travel fast enough through the flash tube for proper operation of the apparatus.

Still another object of the invention is to provide arrangements for relieving concussion in the flash tubes and for avoiding difficulties from concussion such as extinction of the flame.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds.

2

In carrying out my invention in a preferred form thereof when long flash tubes must be utilized, I provide one or more concussion relief units or hoods especially in a vertical section of the flash tube whereby the uninterrupted length of a flash tube section is diminished, and it becomes unnecessary to provide longitudinal slots or other expedients in connection with the flash tube. I relieve concussion in the flash tube by providing a hood having a transverse opening to supply additional air to the flash tube and a shelf or the like for deflecting concussion.

A better understanding of the invention will be afforded by the following detailed description, considered in conjunction with the accompanying drawings, and the scope of the invention will be set forth in the claims.

In the drawings, Fig. 1 is a schematic diagram of a flash lighting system such as may be employed in a household range, for example, for automatically lighting both the top burners and an oven burner from a single constant pilot.

Fig. 2 is a view in elevation of a concussion relief unit forming one embodiment of my invention. Fig. 3 is a longitudinal section of the apparatus of Fig. 2, represented as cut by plane 3—3. Fig. 4 is a view in elevation of a concussion relief unit, employing frusto-conical elements, and Fig. 5 is a longitudinal section of the apparatus of Fig. 4 represented as cut by a plane 5—5.

Like reference characters are utilized throughout the drawing to designate like parts.

A flash lighting system illustrating an embodiment of my invention is shown in Fig. 1. The system illustrated may be employed in a domestic gas cook-stove or range. It comprises a constant pilot burner 11, an oven burner 12 to be ignited from the pilot 11, and a flash tube 13 for effecting the ignition. If desired, an intermittently operated pilot or oven pilot 14 may be interposed between the oven end of the flash tube 13 and the oven burner 12. The pilot burner 11 is shown as enclosed in a suitable housing 15 communicating with the oven flash tube 13 and one or more top-burner flash tubes 16. The top burner flash tubes such as the tube 16 extend radially from the pilot burner housing 15 to range top burner in a conventional manner. The oven flash tube 13 is employed in order that the conventional constant burning pilot burner 11, customarily employed for igniting range top burners, may also be employed for automatically

lighting the oven burner 12 when gas is admitted thereto.

Very frequently the oven and broiler burners of automatic gas ranges are mounted below the so-called top burners, and in any event the oven and broiler burners are ordinarily mounted at a lower level than the top burners. Consequently, the oven flash tube 13 must either have a very steep slope or be provided with a vertical part 17, and furthermore it must be of considerable length compared with the usual top flash tube 16 for conveying a flame from the constant burning pilot 11 to the oven burner 12. As shown, the oven flash tube 13 has a horizontal branch at the upper end with an opening 18 mounted in the pilot housing 15 in proximity to the constant burning flame 19 of the pilot 11. Unless an intermittent pilot such as an oven pilot 14 is employed, the oven burner 12 is arranged to inject raw gas directly into lower open end 21 of the oven flash tube when gas is admitted to the oven burner 12. It is to be understood that the oven burner 12 has a plurality of vertically extending ports for producing the usual jets of flame. For ignition purposes, there is a side port 22. It may be arranged to inject gas directly into the flash tube 13. However, when an intermittent pilot such as the pilot 14 is employed the port 22 serves for ignition from the intermittent pilot 14. As illustrated, the intermittent pilot burner 14 has a suitable head 23 with a pair of side ports. One of the ports is for producing an oven pilot flame 24, serving to ignite gas issuing from the side port 22 of the oven burner. The head 23 has its second side port 25' arranged to inject gas into the open end of the tube 13. When ignited such gas supports a flame 25.

For support of the oven pilot burner 14 a strap 26 may be secured to or extended from the lower portion of the flash tube end 21. Preferably the lower lateral branch 27 of the oven flash tube 13 is on a gradual upward slope from the end 21 to the vertical part 17.

Gas for the oven pilot 14 and the oven burner 12 is supplied from a suitable supply pipe or header 28 having a gas-control valve 29 such as a handcock or a thermostatic valve for controlling the admission of gas to the oven burner 12 and the oven pilot 14. Preferably a pilot-responsive safety valve 31 is interposed in the gas line 32 leading directly to the oven burner 12. A small pipe 33 branching from the supply line is shown for supplying the oven pilot 13.

For the sake of increasing the reliability of the automatic ignition of the oven burner and enabling the oven burner 12 to be ignited whenever the valve 29 is opened and thus making it unnecessary for the safety valve 31 to keep the gas supply shut off, the oven flash tube 13 is preferably arranged so as not to be affected by concussion. It is also preferably arranged to cause relatively rapid flashing of the flame from the constant pilot 11 to the oven burner 12, or the intermittent pilot 14 if the latter is employed. To this end a concussion relief unit 34 is interposed in the oven flash tube 13, preferably in the vertical part 17 thereof. If the flash tube 13 is of unusual length, a plurality of such relief units may be employed. The concussion relief unit constitutes a discontinuity in the flash tube 13, dividing it into what may be called an upper-section 35 and a lower-section 36. The concussion relief unit 34 comprises a bell or a flaring member 37 secured to the lower end of the upper flash tube section 35 and a tubular member 38 secured to or forming a continuation of the upper end of the lower flash tube section 36. Preferably a concussion deflecting shelf 39 is also provided, which is spaced from the open end of the tubular member 38. As illustrated in Figs. 2 and 3, the bell-shaped or flaring member 37 has a large opening 41 downwardly disposed and directed toward the tubular member 38 and a smaller opening 42, which is connected to the flash tube section 35 leading from the constant burning pilot 11. The tubular member 38 may be cylindrical as shown in Fig. 1 or frusto-conical, tapering inwardly toward the open end as illustrated in Fig. 2. As shown in Fig. 2 the tapering member 38 is joined to the flash tube section 36 leading from the burner to be ignited. The concussion deflecting shelf 39 may be flat or washer shaped as illustrated in Figs. 2 and 3, extending radially from a junction of the flash tube section 36 with the tubular member 38. As shown in the drawing, the concussion deflecting shelf 39 has a diameter as great as the bell or flaring member 37 and it is spaced from the open end of the tubular member 38 by a distance of the same order of magnitude as the diameter of said opening, being about three-fourths of this diameter, as in the specific arrangement illustrated.

In order to form the flash tube 13 into a unitary construction with the pilot-burner and ignited-burner sections mechanically connected, straps 43 may be provided, joining the bell member 37 to the collar or concussion deflecting shelf 39. If desired the straps 43 may be integral with the bell member 37 and secured by suitable means such as soldering or brazing to the outer edges of the shelf or collar 39. My invention may be carried out satisfactorily by employing a bell member 37 having a round contour as shown in Figures 2 and 3. However, my invention is not limited to the precise shapes and relationships of parts shown in Figs. 2 and 3.

For example, frusto-conical configuration of the outwardly extending portions of the concussion relief unit may be employed, and in this case there is a bell 37' having a frusto-conical shape and there is a concussion deflecting shelf 39', which is also frusto-conical in shape and flares outwardly toward the open end of the flash tube section 36.

The tubular member 38 for discharging gas into the bell 37' in this case forms a continuation of the flash tube section 36 of slightly reduced diameter. The concussion deflecting member 39' is secured to the tube section in any suitable manner as by means of soldering or brazing.

As already indicated, the flame 19 of the pilot 11 is assumed to burn constantly. When a flame is to be ignited in the oven burner 12, the valve 29 is opened admitting gas to the inlet tubing 33 of the burner 14. Thereupon gas issues from the port 25' and is injected into the lower open end 21 of the flash tube section 26. Air is also entrapped, and the mixture of air and gas rises in the upwardly sloping branch 27 and in the vertical part 17 of the flash tube 13. Upon reaching the relief hood 34, additional air is entrained; whereupon the mixture continues to rise and discharges from the open pilot end 18. The mixture is thereupon ignited producing a flash-back or compression wave extending downwardly through the vertical part of the flash tube 13. Owing to the sudden expansion of the gas mixture upon ignition, a concussion is produced which tends to extinguish the flame travel-

ing toward the burner 14 if the tube 13 is made solid from one end to the other.

However, upon reaching the concussion relief hood 34, the concussion is deflected outwardly by the shelf 39 allowing the flame to pause momentarily, while the mixture enters the bell 37. Additional air is entrained into the open space 44 between the edges of the tubular member 38 and the bell mouth 41 when gas is moving upwardly. It is to be understood that the mixture of air and gas is continuoutly issuing from the tubular member 38. Ignition thereof is caused by the flame which has progressed from the pilot 11 to the bell mouth 37 so that after ignition, the flame continues to travel toward the end 21 until it has reached the flash port 25'. The gas issuing from the injection port or flash port 25' ignites to produce the flame 25. The oven pilot flame 24 is ignited from the flash port flame 25. The gas issuing from the oven burner side port ignites, producing a flame 45 from which the ports of the oven burner 12 are ignited, thus completing the ignition of the oven burner 12.

The concussion relief unit 34 supplies additional air, giving rise to what may be described as relaying action so as to permit flashing of flame through considerable lengths of flash tubing. I have found it unnecessary to make any changes of the adjustments or proportions of the parts of the flash tubing in order to obtain flame travel when changes take place in the temperature of the surrounding atmosphere or of the tubing itself. Furthermore, presence of the concussion relief hood enables a suitable adjustment to be found at any temperature, and makes unnecessary the use of longitudinal slots in the tubing. A high degree of reliability and uniformity of action is accomplished and the tubing remains relatively cool.

In spite of the momentary delay of the flame passage at the relief hood 34, I have found that the flame travels at a considerably greater speed in the flash tube 13 when constructed as shown, than when there is no relief unit. I believe that the increased speed of flame also contributes materially to the reliability of the operation.

I have herein shown and particularly described certain embodiments of my invention and certain methods of operation embraced therein for the purpose of explaining its principle of operation and showing its application but it will be obvious to those skilled in the art that many modifications and variations are possible and I aim, therefore, to cover all such modifications and variations as fall within the scope of my invention which is defined in the appended claims.

What is claimed is:

1. In combination a pilot burner, a second burner mounted at a lower level than the pilot burner, a flash tube joining said burners for igniting the second burner from the pilot burner, said flash tube having a vertical part divided into aligned sections with confronting ends open towards each other, one section having a downwardly extending laterally enlarged mouth, and the other section having its open end extending upwardly to discharge into said mouth and having an external annular concussion-deflecting shelf spaced from its said open end by a distance of the same order of magnitude as the diameter of its said open end, said shelf having a diameter as great as said mouth, and means uniting said aligned sections of the flash tube.



2. In combination a pilot burner, a second burner to be ignited from the pilot burner and a flash tube joining said second burner to the pilot burner, said flash tube being divided into aligned sections with confronting ends open towards each other, one section having a bell mouth extending toward the open end of the other section, and the said other section having an open end extending toward said first named section to discharge into said bell mouth and having a concussion deflecting shelf surrounding and spaced from its said open end by a distance of the same order of magnitude as the diameter of its said open end, said shelf having a diameter as great as said bell mouth, and means uniting said aligned sections of the flash tube.

3. A concussion relief unit for a gas-igniting flash tube comprising in combination a bell with a large open end downwardly disposed and an upper opening for connection with a flash tube section, a tubular member below said bell for discharging gas into said bell, an annular concussion deflecting shelf around said tubular member secured thereto and spaced from the upper end thereof by a distance of the same order of magnitude as the diameter of the end of said tubular member, and straps joining said shelf to said bell, said shelf having a diameter as great as the large open end of said bell.

4. A concussion relief unit for a gas-igniting flash tube comprising in combination a bell with a large open end downwardly disposed and an upper opening for connecting with a flash tube section, a tubular member below said bell for discharging gas into said bell, wherein the tubular member is frusto-conical and decreases in diameter toward the open end thereof, and an annular concussion deflecting shelf around said tubular member secured thereto and spaced from said open end thereof by a distance of the same order of magnitude as the diameter of the open end, said shelf having a diameter as great as the large open end of said bell.

5. In combination a pilot burner, a second burner and a flash tube for igniting said second burner from the pilot burner, said flash tube being divided into two connected sections with aligned confronting spaced ends open toward each other, one section communicating with the pilot burner and having a bell mouth at the end toward the second section, said second section having its aligned end serving as an outlet and having a substantially horizontal inlet arranged for receiving gas from the second burner and directing it through the aligned outlet into said bell mouth, and said second section having an external annular concussion deflecting shelf spaced from the open end thereof by a distance of the same order of magnitude as the diameter of its open end, said shelf having a diameter as great as said bell mouth.

6. In combination a pilot burner, a second burner mounted at a lower level than the pilot burner, and a flash tube joining said burners for igniting the second burner from the pilot burner, said flash tube having a vertical part and a substantially horizontal part, the vertical part being divided into aligned sections with confronting spaced ends open towards each other, one section having a downwardly extending bell mouth, and the other section having its open end extending upwardly to discharge into said bell mouth, said other section being joined to the substantially horizontal part of the flash tube and said horizontal part having an inlet adapt-

ed to receive gas from the second burner, said other section also having a concussion deflecting shelf surrounding it and spaced from the open end thereof by a distance of the same order of magnitude as the diameter of its open end, said shelf having a diameter as great as said bell mouth.

7. A concussion relief unit comprising in combination a pair of hollow frusto-conical members arranged in axial alignment with larger-diameter ends towards each other and spaced from each other, straps joining said frusto-conical members, one of said members having an opening for connection to a pilot-light flash tube section and the second frusto-conical member having a tubular member secured therein extending toward the first frusto-conical member for discharging gas into the first frusto-conical member, and being adapted to be connected to a gas receiving flash tube section.

8. A concussion relief unit comprising in combination a pair of hollow frusto-conical members arranged in axial alignment with larger



diameter ends towards each other, and spaced from each other, one of said members having an axial opening for connection to a pilot light flash tube section and a second frusto-conical member having means therein for discharging gas from a gas-receiving flash tube section into said first frusto-conical member, and strap means for uniting said conical members.

STEHMAN S. MINNICH.


REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,976,870 | Weber | Oct. 16, 1934 |
| 2,087,433 | Hollman | July 20, 1937 |
| 2,091,530 | Slavin et al. | Aug. 31, 1937 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 136,626 | Great Britain | Dec. 17, 1919 |