May 24, 1955 W. I. NISSEN 2,708,842

GAS BURNING CIGARETTE LIGHTERS

Filed June 12, 1952

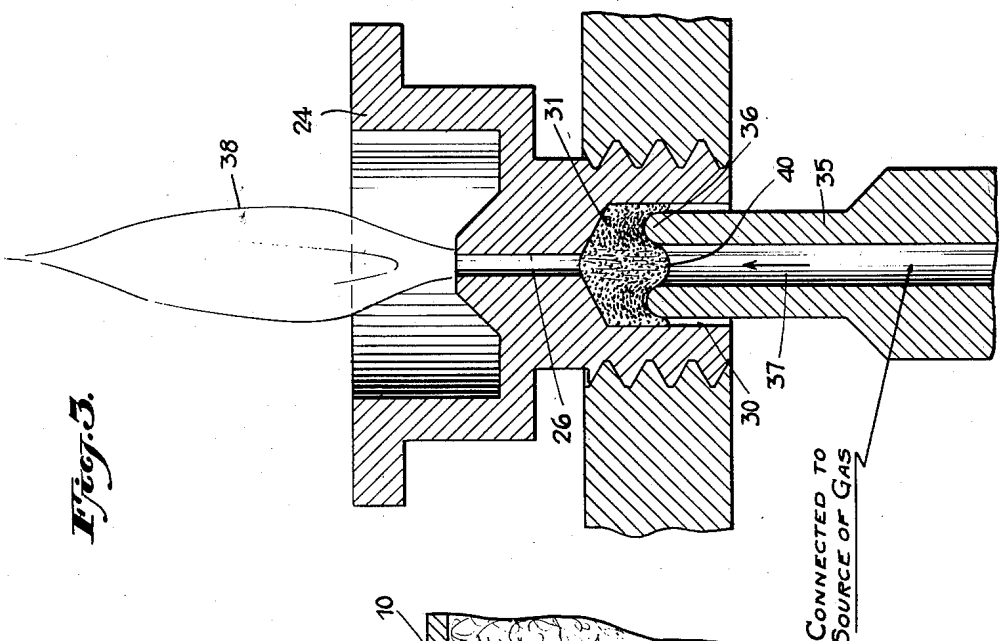

Fig. 3.

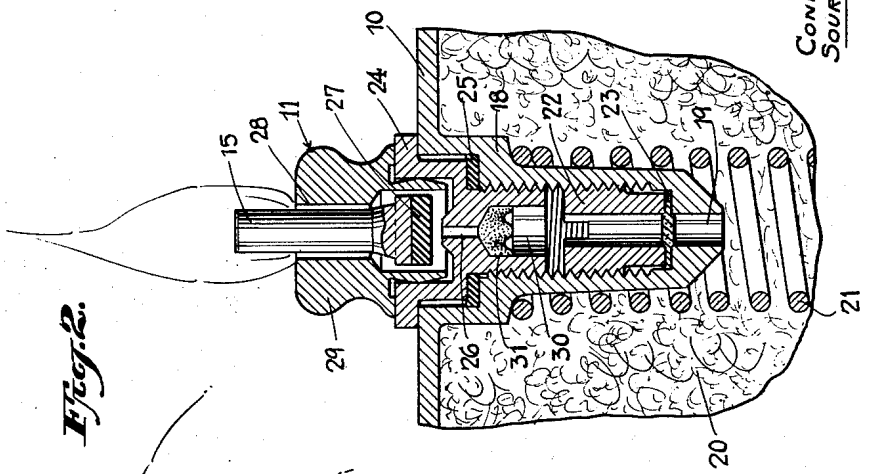

Fig. 2.

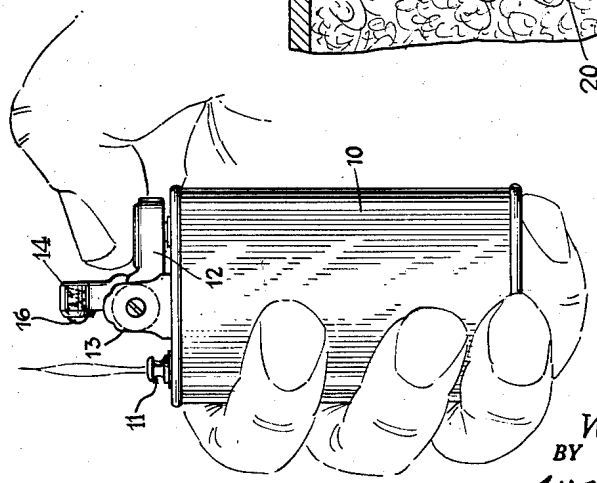

Fig. 1.

INVENTOR.
WARREN I. NISSEN.
BY
Ward, Crosby & Neal
ATTORNEYS.

United States Patent Office 2,708,842 Patented May 24, 1955

2,708,842

GAS BURNING CIGARETTE LIGHTERS

Warren I. Nissen, Basking Ridge, N. J., assignor to Ronson Corporation, Newark, N. J., a corporation of New Jersey

Application June 12, 1952, Serial No. 293,151

2 Claims. (Cl. 67—7.1)

This invention relates to a novel means and method for controlling the flow of gas to the burner in lighters such as are used for lighting cigars and cigarettes and which utilize butane or other gas under pressure as fuel.

Lighters of the class above referred to are now being marketed in which a small orifice is provided for controlling the flow of gas under pressure from the fuel chamber to the valve outlet or burner. In order that the flame will be of the desired predetermined size, such orifices must be quite accurately formed to the required small cross-sectional area, for example in a typical lighter the orifice has to be as small as .0012 inch in diameter, and this has been accomplished by first forming a larger orifice of a size more conveniently drilled, and then by squeezing the metal about such larger orifice so that it will become restricted to the desired smaller size. Orifices made in this way however, involve certain difficulties. It is difficult in any event to form such an orifice accurately with the desired cross-sectional area and it will generally not be of circular cross-section, but irregular in shape, uncertain in action and more likely to become clogged in use. Also single fine orifices of this nature frequently will become clogged due to the fact that during manufacture of the lighter or later, foreign particles occasionally find their way into and become lodged in the orifice, thus reducing its size with a consequent reduction in the size of the flame which the lighter produces.

I have found that these difficulties may be eliminated by the expedient of first forming, instead of a fine orifice, an opening of such diameter that it can be drilled without difficulty, and then inserting in such opening a disc or other piece or mass of metal of a type which is formed with fine interconnected pores distributed therethrough, which provide a multitude of very fine passages for the flow of gas. I have found that the rate of flow of gas through this multiplicity of passages may be accurately and permanently adjusted and controlled by simply applying sufficient pressure to portions of the surface of such piece of porous metal to compress same and thereby close or restrict a sufficient number of the fine passages whereby the flame at the lighter burner is limited to the desired size.

Other and more specific objects, features and advantages of the invention will appear from the detailed description given below, taken in connection with the accompanying drawings which form a part of this specification and illustrate by way of example the presently preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevational view of a typical form of cigarette lighter in which the invention may be embodied.

Fig. 2 is an enlarged vertical sectional view through the burner portion of a lighter embodying the invention; and

Fig. 3 is a view illustrating the method of inserting and adjusting the piece of porous metal for controlling the flow of gas in accordance with the invention.

Referring to the drawings in further detail, Fig. 1 illustrates merely by way of example one well-known type of

lighter in which the invention may be embodied. The lighter as shown comprises a fuel chamber **10** for containing gas under pressure, for example butane. The burner is indicated at **11**. The igniting mechanism may comprise a well-known type of spring-restored depressible fingerpiece **12**, pyrophoric lighting means at **13** and a pivoted snuffer **14** operatively connected and mounted on the top of the fuel receptacle, for example in the manner disclosed in the patent to Aronson No. 2,002,845. However, the construction of that patent, for the purposes of the present invention, is supplemented with features adapting the fuel container to receive the gas under pressure and usually maintained partially liquefied. The burner **11** has therein a valve operated by a depressible valve piece or stem **15** (Fig. 2) such valve being normally held closed by the action of a spring-pressed ball **16** in the snuffer **14**, when the latter is in closed position. Constructions as thus far described have heretofore been marketed.

Referring now to Fig. 2, there is here shown in detail the construction of the novel valve and orifice assembly for the burner. This may comprise a tubular internally threaded portion **18** secured in a wall of the fuel receptacle **10**, the lower end of this part having a central bore **19** through which the gas may flow from a mass of cotton or the like **20** which surrounds a spring-like means **21** within the fuel receptacle, such spring-like means retaining the cotton away from the mouth of the bore **19** so that the latter will not become clogged with cotton or individual cotton strands. A hollow plug **22** is threaded within the portion **18** and serves to retain in place a filter disc **23** through which the gas flows up to the burner, the filter serving normally to exclude from the burner and valve parts any foreign particles or fibers or the like which might otherwise pass up into and cause clogging of the valve parts.

An orifice piece **24** is threaded into the portion **18**, these parts being sealed with respect to each other as by suitable packing **25**. The piece **24** is formed with a central opening **26** therethrough. This may be of a size which can be readily drilled without difficulty, for example of a diameter of 0.013 inch or larger. The upper end of this hole is normally closed by a valve portion **27** mounted on the lower end of the stem **15**. It will be understood that normally the spring-pressed ball **16** in the snuffer **14** holds the valve stem down so that the valve portion **27** seals the opening **26**, but when the snuffer is raised, the gas pressure is sufficient to raise the valve parts **15**, **27**, to the position shown in Fig. 2 whereby the gas is free to flow up through the opening **26** and then up along the parts **15** and **27** through a central opening **28** formed in the burner base **29**.

The orifice piece **24** as initially formed has a bore, cavity or recess **30** formed at its lower side and into which the opening **26** communicates.

The recess **30** is adapted to receive the piece of porous metal above referred to and indicated at **31** in Figs. 2 and 3. Such porous metal may for example be formed of powdered or finely divided particles of bronze which have been sintered together in such manner that fine interconnected pores will remain distributed therethrough thereby providing a multitude of fine tortuous passages through which the gas may flow through the piece **31** up into the opening **26** and thence to the burner. Metal of this type having fine interconnected pores is now readily available on the market with fine pores of various sizes. Preferably for the purposes of this invention, the material used would be of the grade sold as being capable of excluding from its passages particles of about 0.0005 inch in diameter, although other grades may be used.

The piece **31** may conveniently be punched out of a sheet of such porous metal in a manner such that the

piece will be immediately deposited in the cavity 30 of one of the orifice pieces 24. The piece is then preferably secured in place and adjusted in the manner illustrated in Fig. 3. For this purpose a tubular tool as at 35 is preferably used having a rounded annular upper end surface portion as shown at 36 of slightly smaller diameter than the cavity 30. While the orifice piece 24 is suitably held in fixed position, the tool 35 is inserted as shown and by any suitable mechanical means is then gradually urged upwardly so that its upper annular rounded surface 36 presses against the piece 31 and causes the peripheral portions thereof to be pressed radially outwardly somewhat to provide a forced fit to permanently retain the piece 31 in place in the cavity 30 and in a position covering the intake end of the opening 26.

When the tool 35 is thus being pressed up against the piece 31, the channel 37 within the tool is preferably connected with a source of gas under pressure such as to be used in the lighter, and this gas consequently flows through the multitude of fine passages in the piece 31 up through the opening 26 so that the gas may be lighted to provide a test flame as indicated at 38. Before pressure is applied to the piece 31 to compress same, the fine passages therethrough will be sufficient in number and size to provide a flame much larger than would normally be desired for a lighter. But as the tool 35 presses against the piece 31, it will form an annular groove or recess in the latter, and above and about such recess the porous metal will be so compressed as to close off, largely obstruct or reduce the size of the fine passages, leaving, however, a central or axial portion 40 in which a sufficient number of the pores or passages remain open or partially open to provide for a flame of the desired size. While the gas is flowing up through the channel 37 and is lighted to form a flame as at 38, it will be understood that either the tool 35 may be gradually pressed up against the metal piece 31 or the orifice piece 24 may be gradually screwed down with respect to a fixed support and with respect to tool 35 until the burner flame is restricted to the desired height and size. Thereupon the application of compressive force to the piece 31 is discontinued leaving the porous metal in a permanently adjusted condition for controlling the rate of flow of gas to the burner when the piece 24 is assembled with the other parts as shown in Fig. 2.

Thus it will be apparent that by simply applying appropriate pressure to certain areas of the piece 31, it may be secured permanently with a forced fit in the desired position and at the same time its porosity or the area of its effectively porous portion may be permanently adjusted in a substantially tamper-proof way.

It will be understood that the total effective gas carrying capacity of the passages through the piece 31 as finally adjusted will be less than that of the opening or orifice 26 so that it will be the multitude of fine restricted passages which limits and controls the rate of gas flow, rather than the size of the opening 26.

The passages through the piece 31 are so fine that troublesome foreign particles do not tend to enter, and are so numerous that even if a few of them should become clogged, the effect on the gas flow will not be sufficient to noticeably alter the size of the flame. To the extent that foreign particles may tend to enter the pores, since there are myriads of tiny tortuous passages, the particles will be trapped by what may be referred to as "depth filtration," as distinguished from the "surface filtration" effect obtainable by a screen and hence any such particles will not tend materially to alter the total effective gas carrying capacity of the passages. Instead of limiting the control orifice to one tiny opening, for example of 0.0012 inch in diameter as heretofore, and which could easily become clogged, with the present

invention there will be a multitude of almost microscopic openings distributed over a surface area of 1/32 inch in diameter for example. Thus the probability of any material clogging by fine foreign particles is very greatly reduced.

Occasionally burner valves of lighters of the type here involved must be replaced by relatively unskilled employees in widely distributed service stores. The orifice pieces as here disclosed containing the porous metal gas control means, are particularly advantageous under these circumstances, since assurance can be had that the control passages will not be blocked by foreign particles, but will be in the same proper condition as when the parts left the factory.

Although a preferred embodiment of the invention is herein disclosed for purposes of explanation, various modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had to the appended claims in determining the scope of the invention.

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

1. In a lighter construction having a reservoir for containing gaseous fuel under pressure, the combination comprising a burner valve mounted on a wall of said reservoir, a member mounted inwardly of such valve and having an orifice through which the gas may flow to the valve, a cavity communicating with said orifice and a mass of metal formed with fine interconnected pores located in said cavity and covering the inlet of such orifice, said mass of metal having a central portion containing a multitude of fine passages through which gas may flow to the valve, a depressed annular portion surrounding said central portion wherein the metal has been compressed so as to close the pores therein and an outer peripheral portion expanded by a swaging-like operation so as to grip firmly the walls of the cavity, the fine passage of said central portion having a predetermined total effective gas carrying capacity which is less than that of the orifice, whereby such passages will control the rate of flow of gas through the orifice to the burner.

2. In a lighter construction having a gas burner, a valve for shutting off and admitting the flow of gas to the burner, a member having an opening through which gas may flow to said valve, means for protecting said opening against clogging by foreign particles and for controlling the flow of gas through the opening, such means comprising a body of metal covering the opening and formed with fine interconnected pores distributed therethrough, said body of metal having a central portion provided with a multitude of fine passages communicating with said opening and a depressed annular portion surrounding said central portion above and about which the porosity of the metal has been reduced, the total effective gas-carrying capacity of said fine passages controlling the rate of flow of the gas to the burner, and a filtering means through which the gas is conducted before entering said passages.

References Cited in the file of this patent

UNITED STATES PATENTS

1,895,032	Fisher	Jan. 24, 1933
2,153,432	Reich	Apr. 4, 1939
2,297,817	Truxell	Oct. 6, 1942
2,576,610	Kunzog	Nov. 27, 1951
2,604,958	Leufvenius	July 29, 1952
2,608,081	Morgan	Aug. 26, 1952
2,620,643	Nissen	Dec. 9, 1952

FOREIGN PATENTS

157,429	Austria	Nov. 25, 1939