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MIXING DEVICE FOR GAS BURNERS AND THE LIKE

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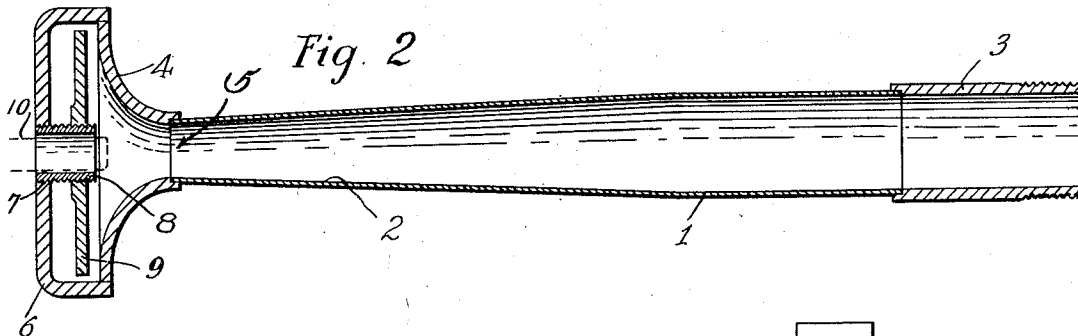
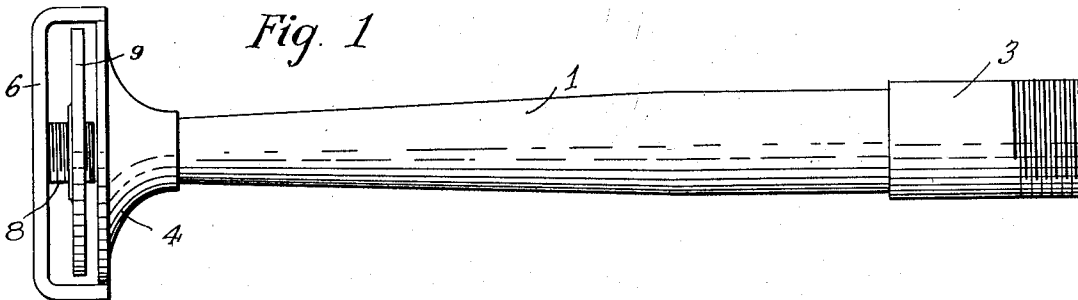


Fig. 3

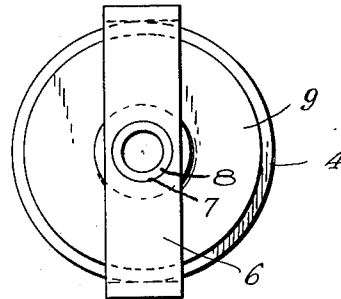
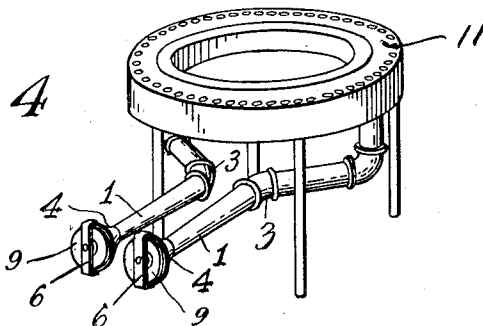


Fig. 4



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MIXING DEVICE FOR GAS BURNERS AND THE LIKE

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This invention relates to mixing devices, and particularly to those which are applicable for use in the mixing of gas and air in gas burners and the like.

5 It has been proposed to inject a jet of gas into one end of a Venturi passage of a tube and move a plate toward and from one end of this Venturi passage to control the amount of air drawn into it by the injector
10 action of the gas jet. The mixing tubes having the Venturi passage heretofore have been formed of cast iron, but inasmuch as it is necessary to core the passage, the walls of the passage have been relatively rough
15 and greatly resisted the free flow of air and gas through the passage. If the tube is made larger so as to decrease the resistance to fluid flow therethrough, difficulty may be encountered through the flame striking
20 back through said passage, especially where the decreased rate of travel of the mixture through the tube is slower than the rate of flame propagation. Furthermore, such
25 castings are expensive to make and are relatively heavy in construction.

An object of the invention is to improve fluid mixing devices.

A further object of this invention is to provide an improved mixing device for gas
30 burners and the like, which will be relatively light in weight and inexpensive in construction; with which the resistance to fluid flow therethrough will be very greatly decreased; and with which the control of the proportion
35 of the mixture may be easily varied.

Various other objects and advantages will be apparent from the following description of an embodiment of the invention, and the novel features will be particularly pointed
40 out hereinafter in the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevation of a mixing device constructed in accordance with this invention;

45 Fig. 2 is a longitudinal, sectional elevation of the same;

Fig. 3 is an end elevation of the same; and

50 Fig. 4 is a perspective of a gas burner having attached thereto mixing devices con-

structed in accordance with this invention.

In the illustrated embodiment of the invention, a metal tube 1, which may originally be cylindrical in shape, is suitably formed
55 or shaped to provide a tapered passage 2 progressively increasing in size for a considerable distance from its smaller end. The larger end of this tube may be connected to a connector 3 in the form of a sleeve or
60 pipe section which is threaded at its free end to enable its connection to a burner. A bell-shaped shell 4 of sheet metal is connected at its smaller end to the smaller end of the tube 1, so that the passages of the
65 shell and tube will form continuations of one another and together will form a Venturi passage 5. The tube 1 may be of any suitable metal having a smooth surface for the passage, but easily and preferably may be formed of a strip of cylindrical steel
70 tubing swaged to give it the desired shape and size.

The shell 4 is preferably a die-drawn stamping of sheet metal, such as steel, and this shell and the tube may be connected together in any suitable manner, but preferably by brazing or welding. The larger
75 end of the tube 1 and the connecting sleeve 3 may be similarly connected. A U-shaped support or strip 6 of suitable metal ribbon or sheet metal is disposed across the larger or open end of the shell 4, so as to extend
80 across the bell of the same, with the arms extending toward the shell and connected to peripherally spaced points of the shell. This connection of the strip 6 to the periphery of the shell 4 may be made by weld-
85 ing or brazing, or in any other suitable manner.

The cross part of the U of the strip 6 is
90 spaced from and extends parallel to the open end of the bell of the shell 4, and at a point substantially co-axial with the axis of the Venturi passage 5 is provided with an aperture 7 in which is fixedly mounted a sleeve or bushing 8 of any suitable material, such
95 as metal. The sleeve 8 projects from the U-shaped strip 6, toward the open end of the bell, as shown clearly in Fig. 2, and is threaded upon its periphery. A valve plate
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9 is threaded upon the sleeve 7 so as to be adjustable endwise along the same when rotated. The valve plate may be circular in shape and extends across the large end of the bell between the arms or sides of the strip 6, so that as it is rotated and thereby threaded endwise along the sleeve, it will be moved toward or from the open end of the shell 4 which constitutes the open end of the Venturi passage.

The plate 9 is imperforate, except for the aperture which receives and has threaded engagement with the sleeve 7, and therefore when it is shifted towards the open end of the shell 4, the space between the peripheral portion of the plate 9 and the periphery of the larger end of the shell 4 will decrease, with the result that the amount of air which may be drawn into the Venturi passage will be decreased. By moving the valve plate 9 away from the shell 4 by reverse rotation on the sleeve 8, the clearance between the valve plate and the open end of the shell 4 will be increased, and consequently more air will be allowed to enter the Venturi passage.

A gas jet pipe 10, shown generally in dash lines in Fig. 2, may be inserted somewhat through the sleeve 8, so as to direct a jet of gas or other fluid into the bell end of the Venturi passage with considerable velocity, and in a direction axially of the Venturi passage. This jet of gas or other fluid thus injected will act as an injector in the Venturi passage, to draw in through the open end of the shell 4 a quantity of air depending in amount upon the position of the valve plate 9, as well as upon the size and velocity of the jet. This mixture will travel along the Venturi passage and into the connector 3. The connector 3 may be connected to any desired type of burner 11 or other device for which the mixture is made, and in Fig. 4 I have illustrated merely one type of such a burner to which are connected the connectors 3 of two mixing devices for supplying a mixture of gas and air thereto.

It will be observed that the inner wall or surface of the passage of the tube 1 will be relatively smooth because it is a machined or finished surface, and inasmuch as it is formed of standardized tubing with a few simple operations performed thereon, the cost of production will be relatively low. The shell 4 may be inexpensively made by drawing the same from a stamping of sheet metal, and consequently the cost thereof will be relatively small. The shell 4 and the connector pipe 3 may be easily connected at little expense to the tube 1 by brazing or welding, so that the parts will be joined in a very rigid, substantial and strong device.

The U-shaped strip or cross member 6 may also be formed by dies from a standard strip of metal ribbon or bar, and the

aperture 7 punched and threaded. The sleeve 8 may be made in an automatic machine at a relatively low cost and the valve plate 4 may constitute a metal stamping with its aperture threaded. With a device made in this way, all of the walls exposed to the passage of the fluid will be very smooth and therefore will offer the minimum possible resistance to the fluid flow therethrough, and the total cost of the article will be very small in comparison with the cost of making cored castings, having machine-finished surfaces in the Venturi passages.

It will be obvious that various changes in the details, which have been herein described and illustrated, in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim as my invention:

1. A mixing device for gas burners and the like, comprising a swaged malleable metal tube having a smooth-walled passage progressively increasing in cross sectional area for some distance from its smaller end, a separately formed drawn metal bell-shaped shell connected at its smaller end to the smaller end of said tube, so as to form a converging entrance thereto, a U-shaped member extending across the larger end of said shell and connected at the free ends of its arms to the periphery of said larger end of said shell, an open-ended threaded bushing carried by the cross bar of said member and projecting toward the larger end of said shell, and a valve plate having an aperture threaded upon said bushing for movement, by rotation, toward and from the larger end of said shell to vary the effective open area of the larger end of said shell.

2. A mixing device for gas burners and the like, comprising a malleable metal tube swaged to have a smooth passage diverging from one end, a malleable metal converging tube fitted at its smaller end to the first tube at the smaller end of the diverging passage thereof, and having an inner surface which is inwardly convex in longitudinal section, with the passages of the tubes forming a smooth continuation with one another and together forming a Venturi passage, and a jet device at the large end of the second tube and spaced from the walls thereof for directing a jet of fluid axially into the converging end of that tube.

3. A mixing device for gas burners and the like comprising a metal conduit having a bell-like inlet end and a continuously smooth finished internal passage from said inlet end, and first converging from said inlet end and then slowing diverging to form a Venturi passage, said bell-like part and conduit being joined by a smooth

joint at the smaller end of said passage, a strap extending across the bell-like end, and having angular legs extending towards and connected to the peripheral portion of the inlet end with the strap spaced from the flared inlet end, a sleeve carried by and extending through said strap towards and axially of the inlet end of the passage for receiving a jet device, and a valve plate disposed between said strap and said inlet end and carried by and adjustable along said sleeve to vary the amount of air admitted to the inlet end around said sleeve.

4. A fluid mixing device comprising a stretch of malleable metal tubing swaged to provide a smooth passage which increases progressively in internal diameter for some distance from one end thereof, a sheet metal stamping having an interior portion drawn into the shape of a trumpet bell and converging to an aperture of a size equal to that of the small end of said tubing, said stamping and tube being connected to one another at the smaller ends of their passages to form together a Venturi-like passage, and a jet device positioned approximately axially of the large end of said bell for directing a jet of one fluid axially into said bell for mixture with another fluid entering the bell around said device.

5. A mixing device for gas burners and the like, comprising a swaged metal tube having a smooth walled passage diverging from one end, a bell shaped drawn metal shell connected at its smaller end to said tube at said one end, with the bores of the tube and shell making a smooth continuous joint with one another and providing a smooth Venturi-like passage, and means connected to the flared end of said shell for varying the effective open entrance space at the larger end of said shell, and having an opening for the injection of a fuel jet into said passage.

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