July 5, 1966 H. L. KOEHRER 3,259,170

GAS BURNER

Filed June 12, 1964

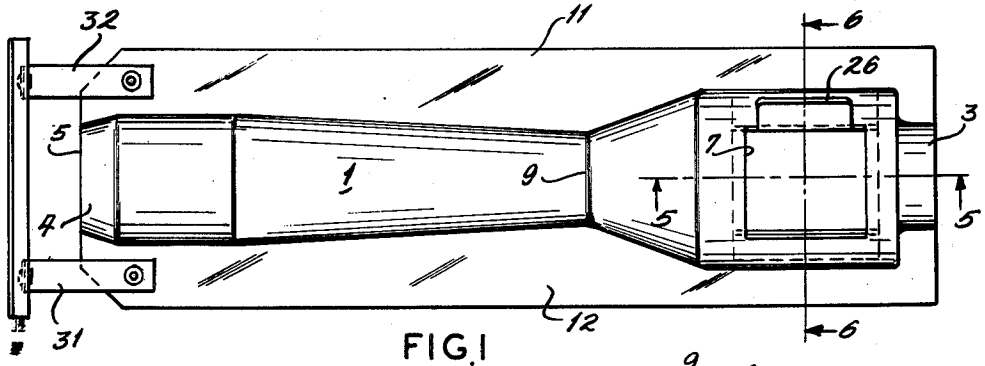


FIG. 1

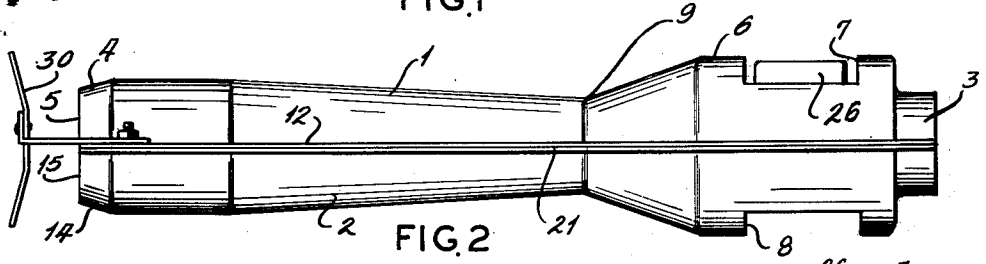


FIG. 2

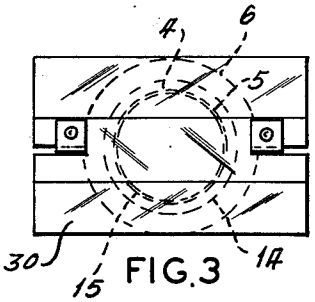


FIG. 3

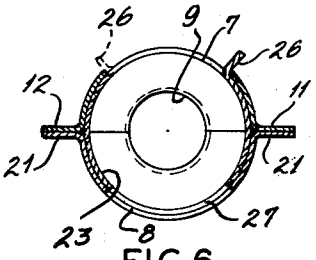


FIG. 6

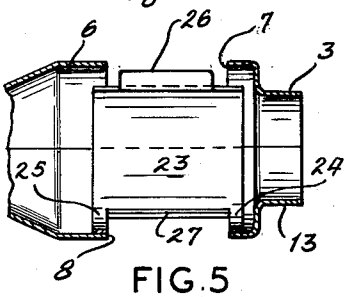


FIG. 5

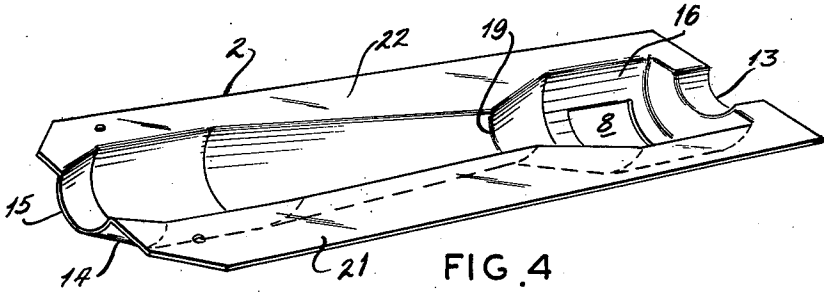


FIG. 4

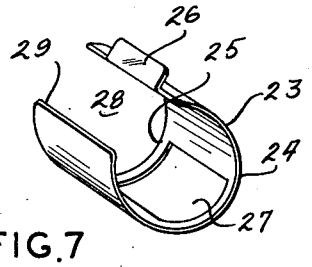


FIG. 7

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3,259,170

GAS BURNER

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This invention relates generally to gas burners for use in various gas-fired appliances, particularly laundry dryers.

Burners of the character referred to are commonly applied to the end of a gas supply line, and include ports for admitting air into a confined zone through which the gas stream is flowing, and for mixing the two together a short distance away from a position at which the combustible stream is ignited. A typical such gas burner is composed of a tubular member connected, at one end, to a gas supply line, and having thereadjacent a ported chamber through which air is admitted into concurrent flow with the stream of gas emerging from the supply line. As the streams of gas and air flow toward the other end of the tubular member, they pass through a constriction having a venturi action which thoroughly mixes the streams of air and gas before they reach the end of the tubular member at which combustion occurs.

Devices of the character aforesaid, as heretofore manufactured, have involved the drawing of tubes and the carrying out of spinning operations thereon to provide the constriction and the proper conformation of the air inlet chamber as well as the tip; and have also involved the formation of cup-shaped parts or sleeves for mounting the tube upon the gas supply line and/or adjusting the effective size of ports through which air is admitted into the tubular member. These are costly and tedious manufacturing operations.

It is the object of the present invention, generally stated, to provide a gas burner of the character aforesaid, and method of making the same, which will reduce the cost of manufacturing such devices.

The invention contemplates, generally, that the customary tubular member be composed of metal stampings or molded parts, preferably two identical halves each embracing half of the circumference of the tubular member. Such halves may be readily manufactured by stamping. For example, given a female die having a cavity contrageneric with half the exterior contour of such a tube, and given a male die having a convexity contrageneric with half the interior contour of the tube, a flat metal sheet may be stamped between such dies, and two such stampings may be assembled together to quickly, easily and cheaply provide such a tube having the desired configuration to form the connection with the gas supply line, the air inlet chamber, the venturi, the tip, and intervening portions. The air inlet chamber may be ported by a single punching operation, preferably carried out on the flat blank before it is die-formed.

The invention further contemplates a more economical control for the air inlets than has heretofore been provided. This is accomplished by conforming a flat strip so as to have a length not greater than, and preferably less than, the interior circumference of the air inlet portion of the aforesaid tubular member; so as to have a width less than the axial dimension of the air inlet portion, but greater than the axial dimension of the ports in the air inlet portion of the tubular member; and bending it so that its length extends circumferentially and fits within the air inlet portion of the tubular member. Preferably, the strip is provided with a protuberance which may be in the form of an out-turned integral tab fitting within one of the ports in the air inlet portion of the tubular member, and movable therein as a shutter so as to control the effective area of said ports. Preferably, such a shutter is formed of a metal which has sufficient inherent resilience that the radius thereof may be contracted, at least about a sixteenth of an inch, by diametrically addressed forces, without impairing its tendency to return to its initial condition when the forces are released. This characteristic permits the shutter strip to be manufactured slightly oversize with respect to the interior diameter of the air inlet portion of the tubular member, so that it must be contracted slightly to get it into position therein, but once in position, there is a sufficient inherent biasing force to maintain the shutter in snug, but sliding, relationship with respect to the interior of said air inlet portion.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

FIGURE 1 is a view in one side elevation of a gas burner constructed in accordance with the present invention;

FIGURE 2 is a view in another side elevation taken at right angles from FIGURE 1;

FIGURE 3 is an end view (which, in operation, is usually the top view) of the burner shown in FIGURES 1 and 2;

FIGURE 4 is a perspective view of a stamping, two of which are utilized in the manufacture of the tubular portion of the burner shown in FIGURES 1 and 2;

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 1;

FIGURE 6 is a sectional view taken along line 6—6 of FIGURE 1; and

FIGURE 7 is a perspective view of the shutter member.

In the manufacture of a gas burner as shown in the drawings, two stampings 1 and 2 made from strips of appropriate sheet metal, and of the conformation shown in FIGURE 4, are assembled together to form a tubular member having at one end a cylindrical nipple 3 for connection with a gas supply line; at the opposite end, a constriction 4, defining an opening 5 of lesser diameter than the adjacent portion of the tubular member; a cylindrical air inlet chamber 6 having diametrically opposite ports 7 and 8, and a constriction 9 forming a venturi between the air inlet chamber 6 and the opening 5. The respective stampings 1 and 2 are identical, that is to say, they may be made in the same set of dies from identical blanks, and as shown most clearly in FIGURE 4, each such stamping has a portion 13 which defines half of nipple 3; an inturned lip 14 which defines half of constriction 4; a semicircular edge 15 which defines half of opening 5; a ported semicylindrical part 16 which defines half of the cylindrical air inlet chamber 6, and all of one of ports 7 or 8 therein; and a constriction of semicircular cross-section 19 defining half of the venturi 9. Additionally, each of the stampings 1 and 2 has oppositely extending flanges, 11 and 12 on stamping 1, and 21 and 22 on stamping 2. The flanges 11 and 21 are identical with each other, and the flanges 12 and 22 are identical with each other, and, preferably, the flanges 11 and 12 are

righthand and lefthand versions of each other. The flanges **11**, **12**, **21** and **22** provide a means whereby the stampings **1** and **2** may be connected together, as by welding, riveting, or any other appropriate means, to form a composite tubular member split in the axial direction of the two identical halves **1** and **2**.

Within the air inlet chamber **6**, there is provided a shutter **23**, preferbaly formed of sheet brass, or other appropriate metal having substantial inherent resilience. The shutter **23** has a width, between edges **24** and **25** thereof, less than the axial dimension of air inlet chamber **6**, but greater than the axial dimension of ports **7** and **8**. In the form shown, the shutter **23** is an incomplete cylindrical sleeve whose outside diameter, in its free and unconfined condition, is slightly greater, by, say, a sixteenth of an inch, than the inside diameter of air inlet chamber **6**. The shutter is, however, readily contractible, so as to be received within the air inlet chamber **6**, and its inherent resilience biases it outwardly into engagement with the interior walls of air inlet chamber **6**. In the form shown, the shutter **23** is provided with a tab **26** projecting outwardly therefrom, and dimensioned so as to be readily receivable within one or the other of ports **7** or **8** and to pass through the same, as clearly shown in FIGURES 5 and 6. The tab **26** not only provides an exteriorly accessible means for rotating shutter **23** about the axis of the air inlet chamber and relative thereto, but also limits the axial movement of the shutter relative to the air inlet chamber **6**, so as to maintain opposite edges **24** and **25** of the shutter at all times axially endward of the margins of at least part of ports **7** and **8**. In other words, the differential in axial length between tab **26** and openings **7** or **8** is preferably less than the differential in axial length between the ports **7** and **8**, on the one hand, and the distance between opposite edges **24** and **25**, on the other hand. Such an arrangement permits of some relative axial movement of the shutter **23** within air inlet chamber **6**, but such axial movement is limited by tab **26** so as to prevent the movement of edges **24** and **25** into position where they are exposed through ports **7** or **8**. In the embodiment shown, the shutter **23** is provided with a port **27**, whose area corresponds substantially to that of ports **7** and **8**; and diametrically opposite port **27**, there is a space **28** between tab **26** and the opposite extremity **29** of shutter **23**. Thus, when the shutter is in the position shown in full lines in FIGURE 6, port **27** in shutter **23** is in full register with port **8**, and the space **28** is in full register with port **7**. Movement of the tab **26** in the counterclockwise direction (as seen in FIGURE 6) to the dotted line position moves port **27** completely out of register with port **8**, and moves space **28** completely out of register with port **7**, thereby reducing the inflow of air to the minimum, which is, in fact, only leakage. Any intermediate position of tab **26** between the full line and dotted line position, shown in FIGURE 6, thus leaves ports **7** and **8** partially open, and consequently provides for the desired adjustment in air intake. In the embodiment shown, the diametrically opposite ports **7** and **8** each embrace about a quadrant of the circumferance of air inlet chamber **6**, while the port **27** and the open space **28** have substantially the same angular extent. Between port **27** and tab **26**, as well as between port **27** and extremity **29**, the shutter **23** is preferably imperforate, but it will be understood that if the parts are so snug fitting that insufficient air to properly support combustion is admitted when the shutter is in the dotted line position shown in FIGURE 6, small perforations may be made in the portions of shutter **23** shown in the drawings as imperforate.

When a burner of the character described is used in situations which require a spreading flame, a suitable baffle may be attached in spaced relationship with opening **5**. An appropriate baffle is illustrated in FIGURES 1, 2 and 3, and consists of a canopy **30** having a pair

of legs **31** and **32**, which may be connected as by rivets, welding, or bolts, to the opposite flanges **11–22** and **12–21** of the composite tubular member. In the form shown, the marginal portions of the canopy **30** are tilted upwardly relative to its central section, thereby tending to spread the flame radially outward and axially away from the burner tip as represented by mouth **5**.

In the manufacture of the burner, the shutter **23** is encaged within the opposite halves of the air inlet chamber **6** before the stampings **1** and **2** are secured together at their flanges **11–22** and **12–21**. If said flanges are to be connected together by welding, it is preferable that the shutter **23** be made of a metal different, or at least having different welding characteristics, from that of stampings **1** and **2**, in order to avoid inadvertent attachment of the shutter to either or both of stampings **22** during the course of welding. Where the stampings **1** and **2** are connected together by rivets or by bolts, it is desirable that the usual precautions be exercised to produce a gas-tight seal between the contiguous faces of flanges **11** and **22** on one side, and **12** and **21** on the other side; and, indeed, when such precautions are taken, the stampings **1** and **2** may be connected by spot welding.

From the foregoing description, those skilled in the art should readily understand that the invention accomplishes its object, and produces a burner which is advantageously economical to manufacture, but, at the same time, provides a wide range of adjustment of air intake, ease of accomplishing such adjustment, and facility of connection to a gas supply line. While one complete embodiment of the invention has been disclosed in detail, it is to be understood that the invention is not limited to the detail of the disclosed embodiment. On the contrary, those skilled in the art will readily perceive of modifications and variations utilizing the principle of the invention, without departing from the spirit thereof or the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a burner for gas-burning appliances having an outlet, a gas inlet, and a venturi between the outlet and the inlet, a cylindrical chamber between said inlet and said venturi, said chamber having a circumferential port to admit air thereto, and means to regulate the flow of air through said port comprising, an incompletely cylindrical shutter within said chamber and having a sliding fit therewithin, said shutter having axial and circumferential dimensions less than that of said cylinder but greater than that of said port, and part of said shutter extending through said port to limit relative rotation between asid shutter and said chamber about the axis of the latter.

2. The combination of claim **1** wherein said chamber has diametrically opposite ports, said part of said shutter is at a circumferential terminus thereof, and said shutter has a port which is aligned with one of said chamber ports when said part is adjacent one edge of the other of said chamber ports, and which shutter port is disaligned with the first-mentioned chamber port when said part is adjacent the opposite margin of the second-mentioned chamber port.

3. A gas-burner comprising, an axially split tubular member composed of identical halves secured together along the split, each end of said member having an opening of lesser cross-section than the adjacent parts of said member, said member being formed to provide a venturi between the ends of said member and a ported cylindrical chamber between said venturi and one end of said member, and an incompletely cylindrical shutter within said chamber and movable relative to the ports therein.

4. The burner of claim **3** wherein the shutter is resiliently biased against the interior walls of said chamber.

5. The method of making a gas burner comprising, forming two identical stampings each defining an axially divided half of a tubular member, and each having a semicylindrical enlargement near one end and a construction intermediate its ends, forming a port in said semicylindrical enlargement, forming an incompletely cylindrical shutter having a port therein, mounting the shutter in the semicylindrical enlargements in one of said stampings, bringing the other stamping into position to encage said shutter in the semicylindrical enlargements of both stampings, and while the shutter is so encaged, securing the sampings together.

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