June 10, 1952 J. H. FLYNN 2,600,160

RIBBON-TYPE GAS BURNER

Filed Jan. 5, 1949 2 SHEETS—SHEET 1

Fig. 1.

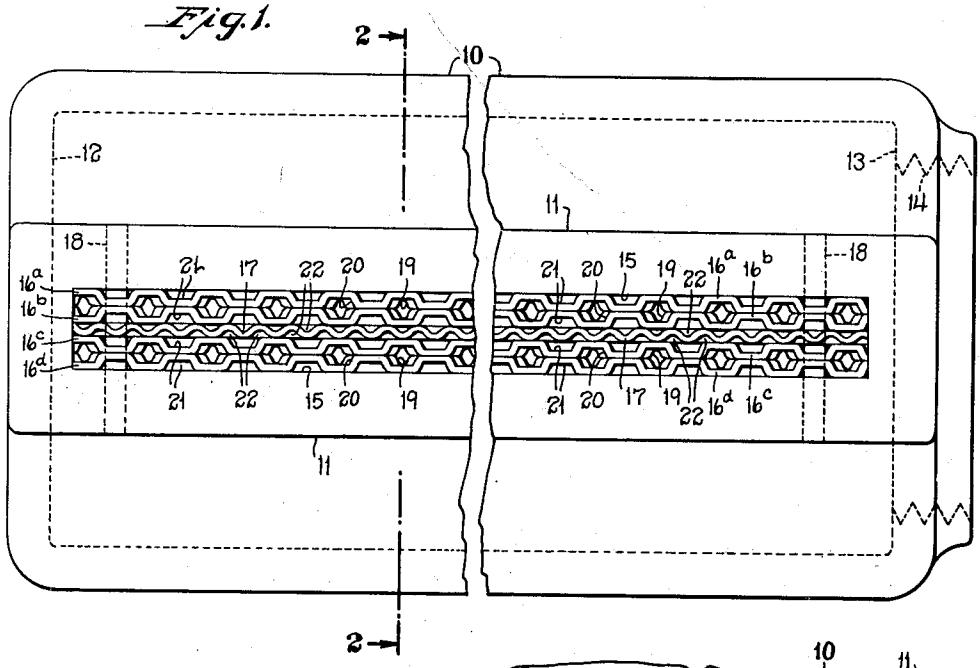


Fig. 9.

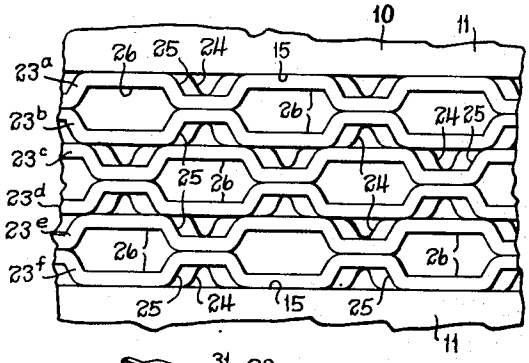


Fig. 2.

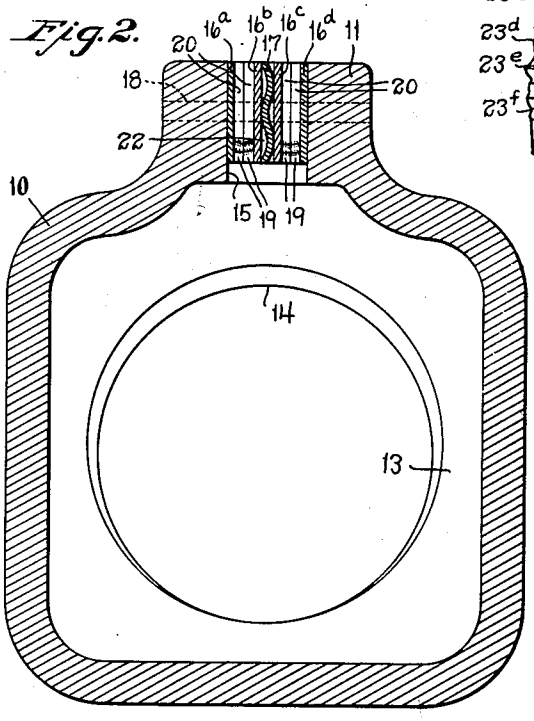
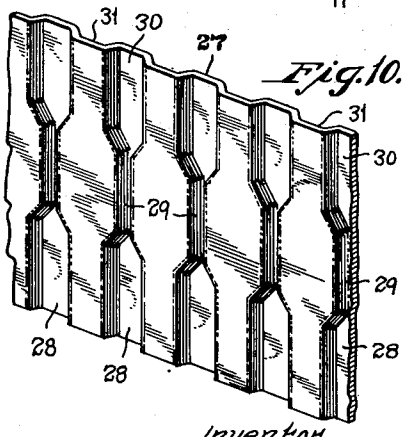


Fig. 10.



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RIBBON-TYPE GAS BURNER

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Fig. 3.

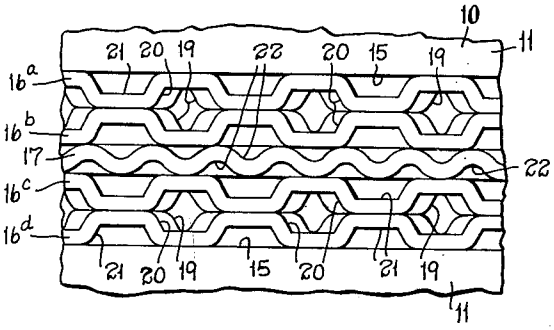


Fig. 4.

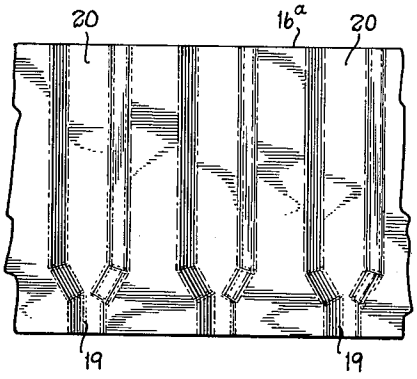


Fig. 8.

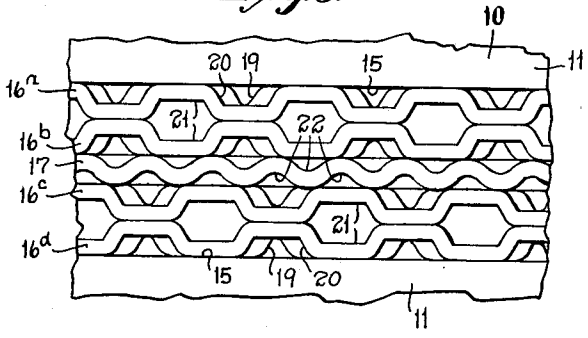


Fig. 5.

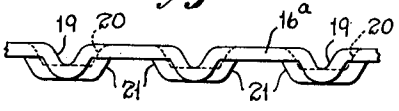


Fig. 7.

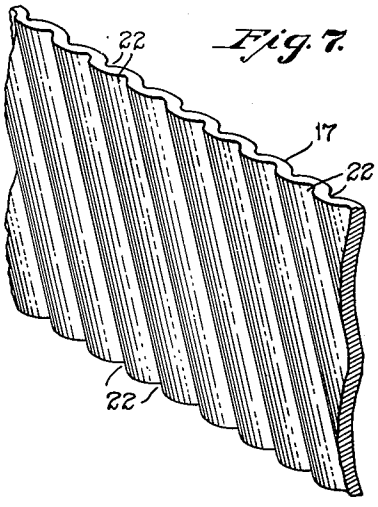
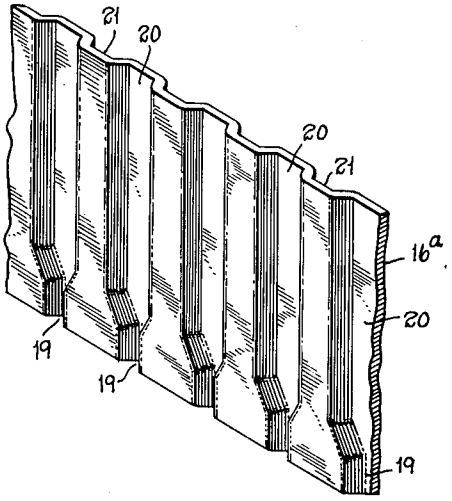


Fig. 6.



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RIBBON-TYPE GAS BURNER

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6 Claims. (Cl. 158—116)

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The present invention relates to improvements in gas burners and relates more particularly to gas burners of the type commonly referred to as "ribbon"-type and usually including a hollow casing or body having a slot (either straight or curved) together with a plurality of corrugated metallic ribbons located in the slot of the said casing to provide a plurality of gas passages for the escape of gas from the interior of the said casing.

The gas above referred to is usually a combustible mixture of a hydrocarbon gas and air usually under an appreciable amount of pressure to meet the exigencies of both industrial and domestic uses. The combustible mixtures referred to vary widely with respect to both calorific values and their flame-propagation rates.

The ribbon-type gas burner of the present invention, in common with similar types of gas burners of the prior art, provides at least two types of gas passages—one type to provide a long flame extending to a point remote from the burner and another type of gas passage providing relatively short pilot flames immediately adjacent the burner. These relatively short pilot flames serve to maintain the longer flames ignited, since the latter flames are usually produced by gas moving at such high velocity as to exceed the flame-propagation rate of the mixture.

As will be apparent from the following, considered in conjunction with the accompanying drawings, the present invention contemplates the embodiment in a burner of one or more ribbons having transverse corrugations with some at least of the said corrugations shaped to each provide an inner gas-restriction portion communicating with an outer gas-expansion portion.

One of the main objects of the present invention, therefore, is to provide a simple and efficient corrugated ribbon designed and adapted to restrict the flow of gas and to subsequently permit the said gas to expand and provide for a reliable piloting gas flame.

Another and more specific object of the present invention is to provide a superior transversely corrugated ribbon suitable for assembly with other corrugated ribbons in a gas burner to reliably provide both high velocity and relatively low-velocity gas passages and which will not set up appreciable distortion stresses in a burner structure when such ribbon expands or contracts in use.

A further object of the present invention is to provide a simple reliable and efficient construction and arrangement of corrugated ribbons to provide pluralities of high main flames together with relatively low piloting flames.

With the above and other objects in view as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art and which are not claimed by me in my co-pending application Serial No. 792,416, filed December 18, 1947, now Patent No. 2,499,482.

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In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken top or plan view of one form of a ribbon-type gas burner constructed in accordance with the present invention;

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmental plan view on an enlarged scale of a portion of the showing of Fig. 1;

Fig. 4 is an elevational view of a fragment of one of the corrugated ribbons and looking toward the face thereof having the gas-restriction portions and gas expansion portions;

Fig. 5 is an inner edge view of the showing of Fig. 4;

Fig. 6 is a broken perspective view of the ribbon shown in Figs. 4 and 5;

Fig. 7 is a similar view of the diagonally corrugated other ribbon shown in Figs. 1 to 3 inclusive;

Fig. 8 is a view similar to Fig. 3 but showing another arrangement of corrugated ribbons;

Fig. 9 is a broken view similar to Figs. 3 and 8 but showing still another arrangement of corrugated ribbons in accordance with the present invention; and

Fig. 10 is a perspective view of a modified form of the ribbon shown in Figs. 4, 5 and 6.

The particular gas burner illustrated in Figs. 1 to 7 inclusive for purposes of making clear a preferred form of the present invention, includes a relatively long hollow casing or body generally designated by the reference character 10 and having a longitudinal rib 11 upstanding from its upper surface. The casing 10 is provided at its respective opposite ends with integral end walls 12 and 13 with the latter being apertured and provided with internal threads 14. The said threads are adapted to receive the threaded end of a supply pipe of any suitable nature (not shown) by means of which a suitable gaseous combustible mixture may be supplied to the interior of the casing in a manner well understood in the art.

The upstanding rib 11 of the casing 10 is formed with a longitudinal slot 15 extending from the interior to the exterior of the said casing and terminating at its ends short of the respective opposite ends of the casing as is indicated in Fig. 1.

Mounted in the slot 15 of the casing 10 is a group of transversely-corrugated ribbons formed of stainless steel or other suitable material and including four substantially identical ribbons 16*a*, 16*b*, 16*c* and 16*d*, and a single ribbon 17 having its

corrugations of a different character from those of the other ribbons just described.

The ribbons 16*a*, 16*b*, 16*c*, 16*d* and 17 may be retained in place in the slot 15 in any suitable manner such, for instance, as by transverse pins 18 indicated in Figs. 1 and 2.

The ribbons 16*a*, 16*b*, 16*c* and 16*d* as above indicated are substantially identical with each other and their corrugations are so formed as to provide on one face of each ribbon a plurality of gas passages each of which includes a gas-restriction portion 19 located at the inner edge of the given ribbon and a gas-expansion portion 20. Each gas-restriction portion is of relatively small cross-sectional area as compared to its communicating gas-expansion portion 20 which is of relatively large cross-sectional area. Thus, each gas-restriction portion 19 communicates with and is complemented by one of the gas-expansion portions 20. The face of each ribbon 16*a*, 16*b*, 16*c* and 16*d* opposite the face in which the portions 19 and 20 are located, is provided with gas channels 21 which alternate in a longitudinal direction with the portions 19 and 20 just previously referred to and have substantially the same cross-sectional area as the portion 20.

The ribbon 17 is, as shown, preferably corrugated so as to provide gas channels 22 in its respective opposite faces and which gas channels are inclined as is especially well shown in Fig. 7.

The ribbon 16*a* is shown in Figs. 1 and 3 as being in contact with the adjacent side wall of the slot 15 in such manner that its gas channels 21 have one side closed by the said side wall. The ribbon 16*b* is reversed with respect to the ribbon 16*a* and is in contact therewith so that any given one of its gas passages constituted by a given communicating gas-restriction portion 19 and gas-expansion portion 20 are in registry with and complement the similar features of the ribbon 16*a*, as is especially well shown in Figs. 1 and 3.

The ribbon 17 is interposed between the ribbon 16*b* and the ribbon 16*c*, and the latter ribbon cooperates with the ribbon 16*d* in the same manner as the two ribbons 16*a* and 16*b* cooperate.

A combustible gas or gaseous mixture from the interior of the casing or body 10 will pass out through the inner gas-restriction portions 19 of the various ribbons and be restricted in amount thereby and will pass then into the outer gas-expansion portions 20 where the velocity will be slowed down so as to provide the burner with suitable low pilot flames closely adjacent the upper surface of the ribbons. These pilot flames will maintain the taller flames provided by the combustion of the gases emerging from the larger passages.

The structure of Fig. 8 employs the same five ribbons illustrated in the preceding figures save that the ribbons are arranged differently.

In Fig. 8 the ribbon 16*a* is in contact with the adjacent side wall of the slot 15 as is the case in Figs. 1 and 3 but it is reversed so that the gas-restriction portions 19 and their respective complemental gas-expansion portions 20, face toward the said side wall. The ribbon 16*d* is likewise reversed from the showing of Figs. 1 and 3 so that its portions 19 and 20 face toward the adjacent side wall of the slot 15.

Furthermore, in Fig. 8 the ribbons 16*b* and 16*c* are also reversed so that their respective gas-restriction portions 19 and gas-expansion portions 20 face toward the ribbon 17.

In the arrangement of ribbons shown in Fig. 8, a combustible gas or gaseous mixture will in its outward flow, be restricted by the gas-restriction portions 19 and will thereafter be permitted to expand and slow down in the respective gas-expansion portions 20 which respectively communicate with the gas-restriction portions 19.

Thus, piloting flames are provided in a simple and effective manner to sustain the burning of taller flames resulting from gas emerging through the larger and relatively unrestricted gas passages at relatively high velocities.

In Fig. 9 there is shown as mounted in the slot 15 of the casing or body 10, three pairs of transversely corrugated ribbons respectively designated as 23*a*—23*b*, 23*c*—23*d* and 23*e*—23*f* similar to the ribbons 16*a*, 16*b*, 16*c* and 16*d* previously described in that they are each provided in one face with gas passages each including an inner gas-restriction portion 24 in communication with an outer gas-expansion portion 25 respectively having the same general characteristics as have been described previously in connection with the portions 19 and 20.

The face of each ribbon opposite the face in which the portions 24 and 25 are formed, is provided with gas channels 26 which alternate in a longitudinal direction with the portions 19 and 20 and have a slightly larger cross-sectional area than the said portions 20.

The pair of ribbons 23*a*—23*b* have their corrugations arranged in registration and in opposition to each other, as do also the respective pairs of ribbons 23*c*—23*d* and 23*e*—23*f*. The arrangement is such, however, that the intermediate pair of ribbons 23*c*—23*d* is displaced longitudinally so that their respective similar corrugations are located intermediate the similar corrugations of the ribbons 23*a*—23*b* and 23*e*—23*f*.

By means of the arrangement of ribbons shown in Fig. 9, the relatively large passages provided by the mating gas channels 26 of the various ribbons will provide for relatively tall flames, each of which will have adjacent its base, pilot flames provided by gas burning close to the surface of the said ribbons and flowing outwardly, first rapidly and in small volume through the gas-restriction portions 24 and thence slowly out of the gas-expansion portions 25.

The ribbons 16*a*—*b*—*c*—*d* and 23*a*—*b*—*c*—*d*—*e*—*f* all have their respective gas-restriction portions located at the inner edges of the ribbons. In the ribbon 27 illustrated in Fig. 10, there is provided a plurality of corrugations each including a lead-in portion 28 leading outwardly from the inner edge of the ribbon and at its outer end communicating with a gas-restriction portion 29. At its outer end, the gas-restriction portion 29 communicates with a gas-expansion portion 30.

The lead-in portions 28 and the gas-expansion portions 30 above described have relatively large cross-sectional areas as compared to the cross-sectional area of the gas-restriction portion 29, and preferably the portions 28 and 30 will be substantially identical so that the ribbon may be reversed as desired.

The face of the ribbon 27 opposite to that in which the portions 28, 29 and 30 are formed is, in turn, formed with gas channels 31 similar to the gas channels 22 and 26 before described.

Ribbons like 27 may be used in various assemblies to replace or supplement the ribbons previously described.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present em-

bodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corrugated ribbons located in the slot of the said casing; said group of ribbons including at least one ribbon having a plurality of transverse corrugations each shaped to provide an inner gas-restriction portion of relatively small cross-sectional area and a coaxial outer gas-expansion portion having a relatively large cross-sectional area as compared to the said gas-restriction portion and communicating directly with the latter by a sharply converging throat portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

2. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corrugated ribbons located in the slot of the said casing; said group of ribbons including at least one ribbon having a plurality of transverse corrugations alternate ones of which are shaped to each provide an inner gas-restriction portion of relatively small cross-sectional area and a coaxial outer gas-expansion portion having a relatively large cross-sectional area as compared to the said gas-restriction portion and communicating directly with the latter by a sharply converging throat portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

3. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corruguated ribbons located in the slot of the said casing; said group of ribbons including at least a pair of mutually engaging ribbons each having a plurality of transverse corrugations registering with the similar corrugations of the other of the said pair and each of which corrugations is shaped to provide, in conjunction with a registering similar corrugation of the other ribbon of the other of said pair of ribbons, an inner gas-restriction portion of relatively small cross-sectional area and a communicating outer gas-expansion portion having a relatively large cross-sectional area as compared to the said gas-restriction portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

4. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corrugated ribbons located in the slot of the said casing; said group of ribbons including at least a pair of mutually engaging ribbons each having a plurality of transverse corrugations registering with similar corrugations of the other ribbon of the said pair and each alternate ones of which registering corrugations being shaped to provide, in conjunction with a similar registering corrugation of the other of said pair of ribbons, an inner gas-restriction portion of relatively small cross-sectional area and a communicating outer gas-expansion portion having a relatively large cross sectional area as compared to the said gas-restriction portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

5. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corrugated ribbons located in the slot of the said casing; the said group of ribbons including a pair of substantially identically corrugated ribbons and a third ribbon interposed between the said pair, each of the said pair of ribbons having a plurality of transverse corrugations each shaped to provide an inner gas-restriction portion of relatively small cross-sectional area and a coaxial outer gas-expansion portion having a relatively large cross-sectional area as compared to the said gas-restriction portion and communicating directly with the latter by a sharply converging throat portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

6. A ribbon-type gas burner, including in combination: a casing having a slot therein which leads from its interior to its exterior; and a group of transversely corrugated ribbons located in the slot of the said casing; the said group of ribbons including a pair of substantially identically corrugated ribbons and a third ribbon interposed between the said pair, each of the said pair of ribbons having a plurality of transverse corrugations, each alternate one of which corrugations in a given ribbon of said pair being shaped to provide an inner gas-restriction portion of relatively small cross-sectional area and a coxial outer gas-expansion portion having a relatively large cross-sectional area as compared to the said gas-restriction portion and communicating directly with the latter by a sharply converging throat portion; whereby gas escaping from the interior of the said casing will be limited in volume by the said gas-restriction portions and later permitted to expand and slow down in the said gas-expansion portions before emerging through such corrugations.

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