May 23, 1933. H. W. LE BOUTILLIER ET AL 1,910,020

BURNER AND METHOD OF MAKING THE SAME

Filed June 30, 1928

Fig. 3,

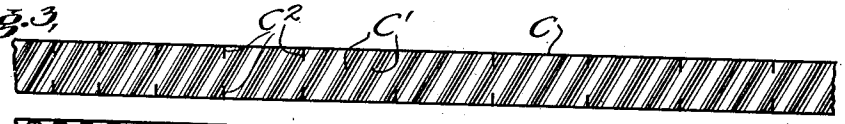

Fig. 4,

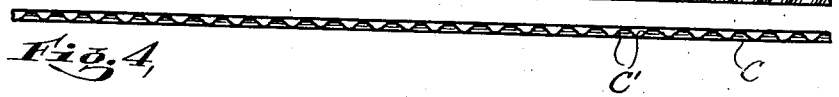

Fig. 5,

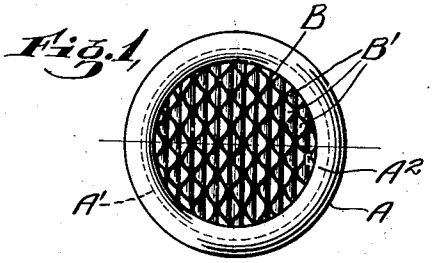

Fig. 1,

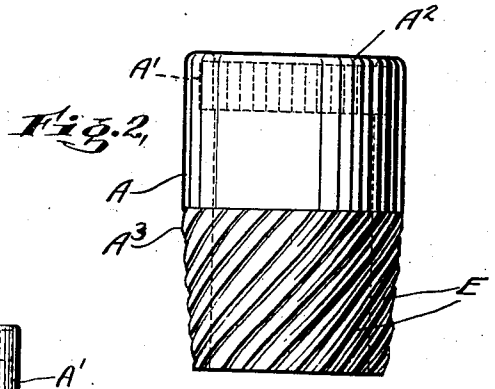

Fig. 2,

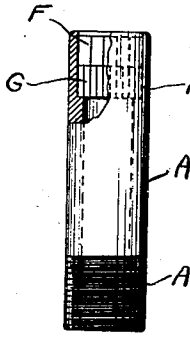

Fig. 6,

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Patented May 23, 1933 1,910,020

UNITED STATES PATENT OFFICE

HENRY W. LE BOUTILLIER, OF DREXEL HILL, AND FRED HESS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE SELAS COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

BURNER AND METHOD OF MAKING THE SAME

Application filed June 30, 1928. Serial No. 289,574.

The present invention relates to burners for burning pre-mixed air and combustible gas and particularly to burners of the sieve cap type, i. e., burners having a metallic screen in their outer end forming a multiplicity of discharge passages.

The object of our present invention is to provide an improved construction of a sieve cap burner which is characterized by its low cost of manufacture, low gas resistance and improved provisions for preventing back fire and securing the burner in place. A further object of our invention is to provide an improved form of metallic burner screen and method of making the same.

The various features of novelty which characterize our invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it reference should be had to the accompanying drawing and descriptive matter in which we have illustrated and described preferred embodiments of the invention.

Of the drawing:

Fig. 1 is a plan view; and

Fig. 2 is an elevation of the assembled burner;

Fig. 3 is an elevation of the corrugated metal strip;

Fig. 4 is a plan view of the strip;

Fig. 5 is an elevation of the strip as bent for insertion in the burner body; and

Fig. 6 is an elevation of a modified form of burner.

In the drawing and particularly in Figs. 1 and 2 we have illustrated a preferred embodiment of our invention in which a gas burner comprising a tubular body A of any desired diameter is provided with a counterbored portion A′ at one end as shown in dotted lines in Fig. 2. A metal screen B constructed in the manner hereinafter described and having a multiplicity of small passages B′ therein for the passage of a combustible mixture is arranged in the counterbored section A′ of the body. The top edge portion A^2 of the burner body extending beyond the metal screen is spun over sufficiently to retain the screen in position in the counterbored portion.

The burner screen B consists of a strip of metal having corrugations extending at an oblique angle to the top and bottom edges of the strip, and folded along its length with the corrugations of adjacent faces of the sections at an angle to one another. When the burner body top portion is circular in cross-section, which is the most advantageous form, the screen strip is folded at unequally spaced points along its length with the middle sections of greater length than the end sections, so that when the folded sections are compressed the screen will substantially conform to the burner cross-section.

Our improved method of making a screen of this type consists in passing a metal ribbon C of relatively small width between a pair of rollers which corrugate the metal in the form shown in Fig. 3. The corrugations C′ as shown extend at an angle to the longitudinal axis of the strip. The overall thickness of the strip is substantially increased by the corrugating operation. In one size of burner in use the blank strip is three-sixteenths of an inch wide and eight-one thousandths of an inch in thickness. On being corrugated the overall thickness is approximately one-thirty second of an inch. It is understood, of course, that the above figures are by way of example and not of limitation.

The corrugated strip is then passed through a second pair of rollers, one of which is formed with a set of teeth in its periphery. The teeth are arranged in pairs with the teeth of each pair in spaced alignment. The separate pairs of teeth are unequally spaced about the roll circumference so that the upper and lower edge portions of the strip are weakened by indentations C^2 at unequally spaced points as shown by the dotted lines in Fig. 3. The length of strip required for each burner screen having been determined, the toothed roller is provided with a tooth extending across the full width of the strip and so positioned on the periphery of the roller that a full width indentation is made in the strip at certain points corresponding to

the desired strip length. The portion of the strip between two of these points is divided into indented sections, the length of which increases toward the center of the section for a burner opening of circular cross section. The spacing of the indentations C^2 can be varied for burners of different size and cross-sections.

The marking operation can be advantageously performed in many cases by a punch tool having teeth spaced at the proper distances or by a single punch operated by a suitably shaped cam.

The strip is then broken into the length defined by the full width indentations and each length is folded at the weakened points along its length as shown in Fig. 5. The folded strip is then inserted by a suitable tool into the counterbored portion of the pipe.

The folding of the strip along its length results in the corrugations of adjacent sections being arranged at an angle to one another and prevents nesting of the corrugated surfaces. The individual corrugations are preferably at an angle between 45° and 75° relative to the top and bottom of the strip. The construction described produces a screen having a multiplicity of inclined channels, each of which has a cross-section corresponding to the size of the corrugations.

The lower portion A^3 of the burner body may be threaded for engagement with the pipe or other container in which it is to be used. Preferably, however, the lower portion is beveled toward its end and knurled with a fine knurl E substantially as shown in Fig. 2.

The burner of our invention is particularly characterized by its low cost of manufacture, the effectiveness of the structure, and the ease with which it may be installed. Oxidation of the metal used in the screen is one of the main operating problems of burners of this type. The screen of the present construction is made of a metal suitably resistant to oxidation, such as Monel metal or pure nickel. The burner body when used under ordinary operating conditions is formed from steel or iron pipe. Under extreme conditions the body may be also made of a metal highly resistant to oxidation. The manufacturing operations are few and require relatively unskilled labor. The screen construction described is especially effective in preventing back fire of the combustible mixture in the burner. Former constructions for eliminating back fire have resulted in burners having an undesirably high back pressure. The present arrangement of the screen passages, however, provides a very low gas resistance in the screen and a minimum back pressure in the burner. The lower end of the burner body is preferably beveled and knurled as most installations are made in the field. When the burners are knurled it is only necessary to drill the burner openings in the pipe or container surface and to drive the burners into the corresponding openings. This construction provides a relatively permanent gas-tight connection and eliminates the numerous threading operations which are relatively expensive when performed in the field.

In the modifications illustrated in Fig. 6, the burner body A is provided with a plurality of screens in the counterbored section A′ at the upper end of the burner. The screens are arranged in superposed relation and the gas passages in one of the screens are made of a different cross sectional area than those of the other, although it may be advantageous in some cases to provide screens having the same size passages. The construction shown is particularly adapted for use in installations wherein matter accumulates on the top of the burner and the screen gas passages would be quickly clogged and the burner rendered inoperative unless the passages are of sufficient size to render cleaning easy. As shown the upper screen F is made with relatively coarse corrugations and the lower screen G with relatively fine corrugations. The upper gas passages are therefore of greater cross-sectional area than the lower passages. With the present arrangement of a coarse screen and fine screen, back fire is prevented by the fine screen while an efficient gas flow is maintained under all conditions. In this form the lower portion of the burner body is shown as threaded, although it can be knurled as shown in Fig. 2.

While in accordance with the provisions of the statutes, we have illustrated and described the best form of embodiment of our invention now known to us, it will be apparent to those skilled in the art that changes may be made in the form of the article disclosed and the method of making the same without departing from the spirit of our invention as set forth in the appended claims and that in some cases certain features of our invention may be used to advantage without a corresponding use of other features.

Having now described our invention what we claim as new and desire to secure by Letters Patent, is:

1. A gas burner comprising a gas container having an opening therein and a screen consisting of a strip of metal having a multiplicity of inclined corrugations and folded along its length to form a plurality of side by side integrally connected sections and mounted in said opening.

2. A gas burner comprising a tubular body having a counterbored end portion, a screen consisting of a strip of obliquely corrugated metal folded along its length in said counterbored portion, and the adjacent end of said body being spun over to retain said screen in position.

3. A gas burner comprising a tubular body having a counterbored portion at one end, a screen in said counterbored portion having a multiplicity of passages therein, and the opposite end of said body being tapered and knurled for securely mounting said body in a drilled opening.

4. A gas burner comprising a tubular body having one end counterbored, and a screen in said counterbored portion consisting of a strip of metal having inclined corrugations therein and folded along its length.

5. A fire screen for a gaseous fuel system comprising a strip of imperforate metal folded along its length into a plurality of juxtaposed integrally connected portions, the adjacent faces of each pair of juxtaposed portions being arranged to form a plurality of gas passages parallel to planes of said portions.

6. A fire screen for a gaseous fuel system comprising a strip of metal having inclined corrugations therein and folded along its length into a plurality of integrally connected contacting sections with the corrugations of each pair of contacting faces at an angle to one another.

7. A fire screen for a gaseous fuel system comprising a strip of metal having inclined corrugations therein and bent along its length into a plurality of sections, the sections increasing in length towards the middle of the strip, and the corrugations of each pair of contacting faces being at an angle to one another.

8. An article of manufacture consisting of a thin strip of metal having corrugations extending at an oblique angle to the length of said strip, said strip being weakened at spaced points along its length and arranged to be folded at said weakened points.

9. The method of making a fire screen for a gaseous fuel system which comprises corrugating an elongated strip of metal, and arranging each strip so formed into a plurality of integrally connected contacting sections with the corrugations of each section angularly displaced relative to the corrugations of the section contacting therewith.

10. The method of making a fire screen for a gaseous fuel system which comprises corrugating an elongated strip of metal with the corrugations inclined at an angle to the side edge portions and folding the strip along its length into a plurality of portions of unequal length with the corrugations of adjacent portions at an angle to one another.

11. A gas burner comprising a tubular body having an axial passage for a combustible gas therein, and a plurality of burner screens located in the discharge end of said passage in a series relation, the gas passages in the outer screen being substantially larger in cross-section than the passages in the inner screen, whereby cleaning of the outer screen is facilitated and back fire is minimized.

12. A gas burner comprising a body portion having a longitudinal passage for a combustible gas therein, and a plurality of screens in superposed relation in said passage, each of said screens being formed of a folded strip of corrugated metal, the corrugations in the lower of said screens being finer than the corrugations in the upper of said screens.

13. A gas burner comprising a body portion having a passage for a combustible gas therein and a plurality of screens arranged in series in the discharge end of said passage and having a multiplicity of gas passages formed therein, the gas passages in the inner screen being of smaller cross section than the passages in the outer screen, and one of said screens being formed by an elongated strip of metal having a plurality of inclined corrugations and folded along its length into a plurality of pairs of contacting sections.

14. A gas burner comprising a body portion having a passage for a combustible gas therein and a plurality of screens arranged in series in the discharge end of said passage and having a multiplicity of gas passages formed therein, each of said screens being formed by an elongated strip of metal having a plurality of inclined corrugations and folded along its length into a plurality of pairs of contacting sections, the corrugations in the inner screen being finer than the corrugations in the outer screen.

15. A gas burner comprising a body portion having an opening therein and a burner screen arranged in said opening and comprising an elongated strip of metal of relatively narrow width having a multiplicity of inclined corrugations in a portion of its width, said strip being folded along its length into a plurality of pairs of integrally connected contacting sections, the corrugations of each pair of contacting sections being angularly displaced.

16. A fire screen for a gaseous fuel system comprising an elongated strip of material of relatively narrow width having a multiplicity of inclined corrugations in a portion of its width, said strip being folded along its length into a plurality of pairs of integrally connected contacting sections, the corrugations of each pair of contacting sections being angularly displaced sufficiently to prevent nesting of the corrugations of contacting surfaces.

17. The method of making a fire screen for a gaseous fuel system which comprises forming a multiplicity of inclined corrugations in an elongated strip of thin material of relatively narrow width and folding the strip along its length into a plurality of pairs of integrally connected contacting sections with

the corrugations of each pair of contacting sections arranged at an angle to one another.

18. The method of making a fire screen for a gaseous fuel system which comprises forming a multiplicity of inclined corrugations in an elongated strip of thin metal of relatively narrow width, weakening the strip at a plurality of predetermined points along its length and folding the strip along its length at the weakened points into a plurality of pairs of contacting sections with the corrugations of each pair of contacting sections angularly displaced.

Signed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, this 28th day of June, A. D. 1928.

HENRY W. LE BOUTILLIER.
FRED HESS.