April 10, 1951

J. W. MILLER

2,548,117

VAPORIZING TYPE OIL BURNER

Filed Aug. 15, 1947

2 Sheets-Sheet 1

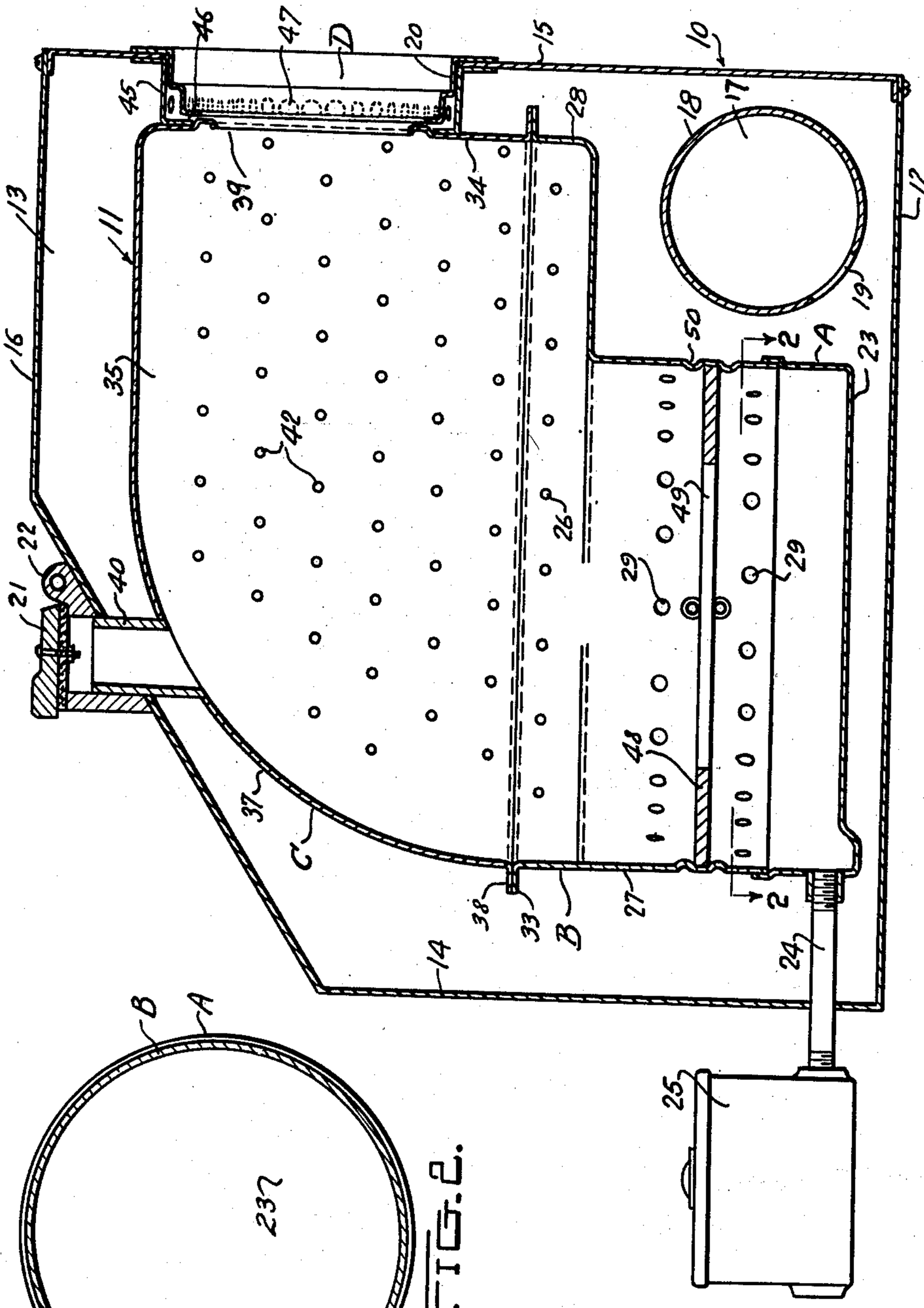

FIG. 1.

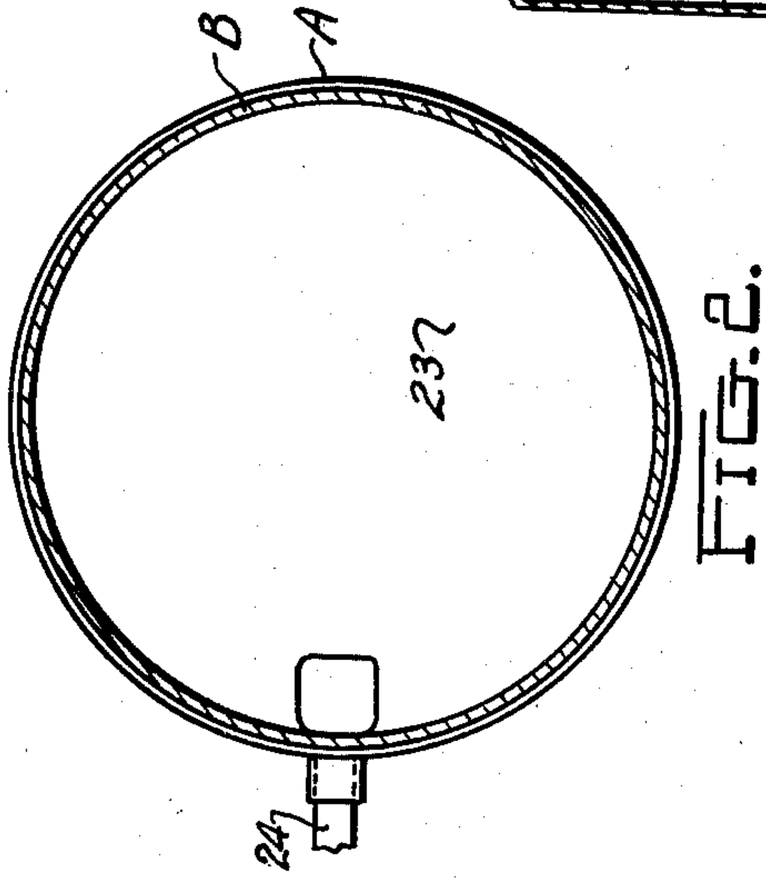

FIG. 2.

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FIG. 4.

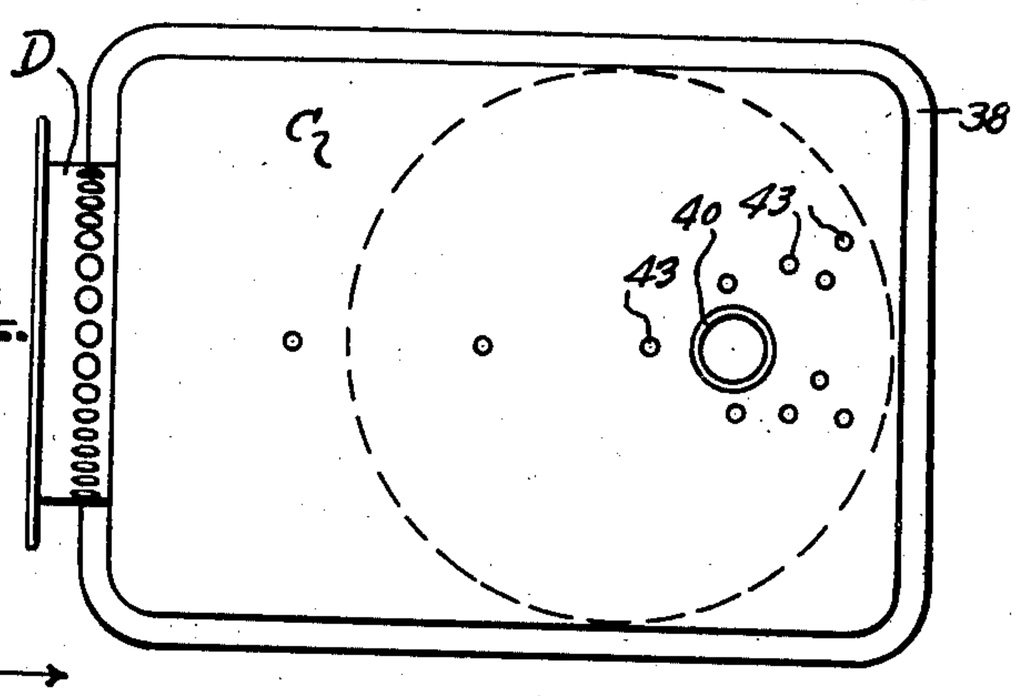
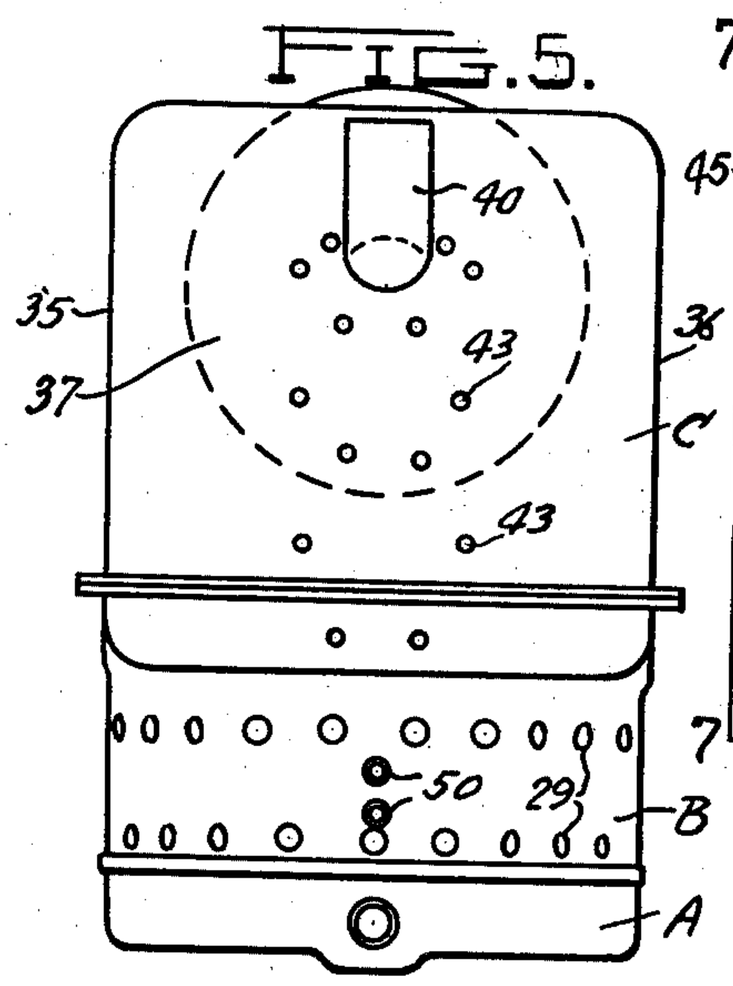


FIG. 5.



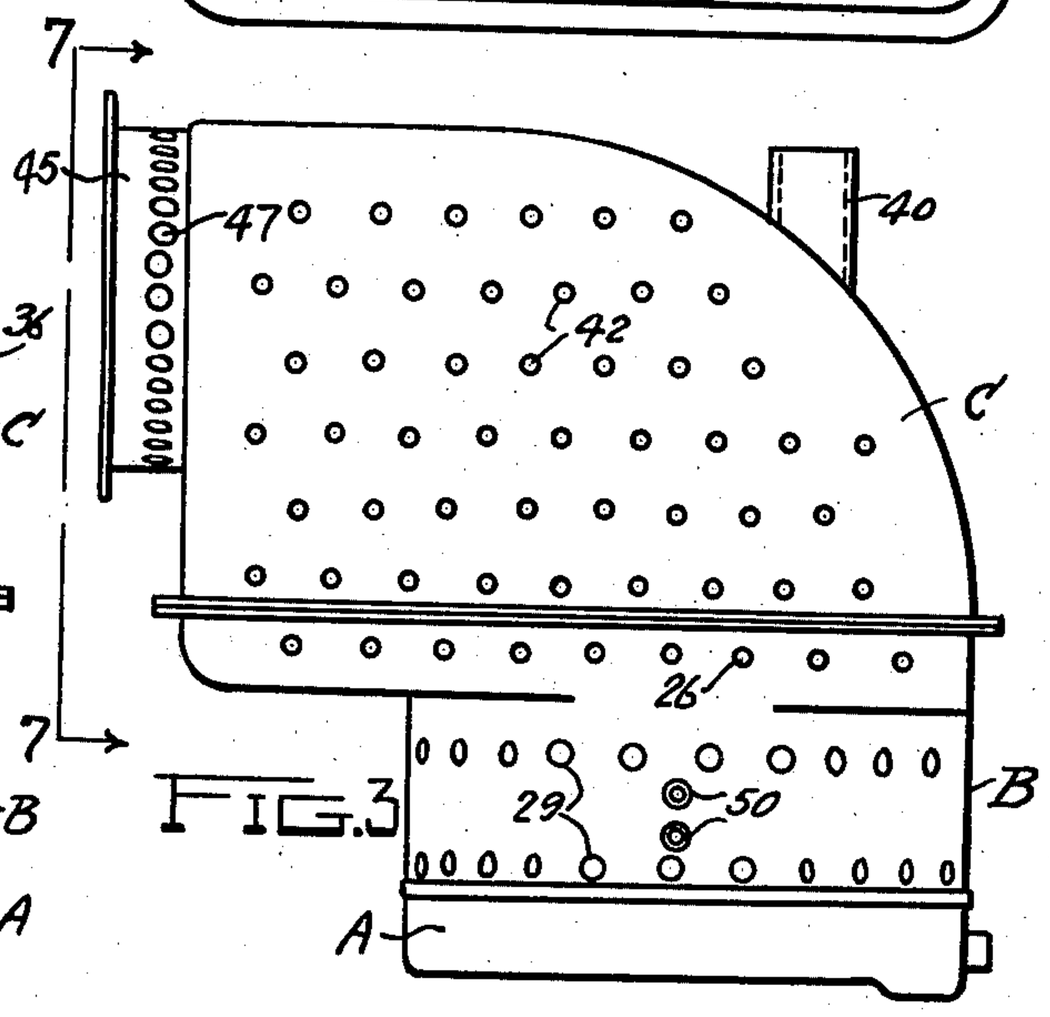


FIG. 3

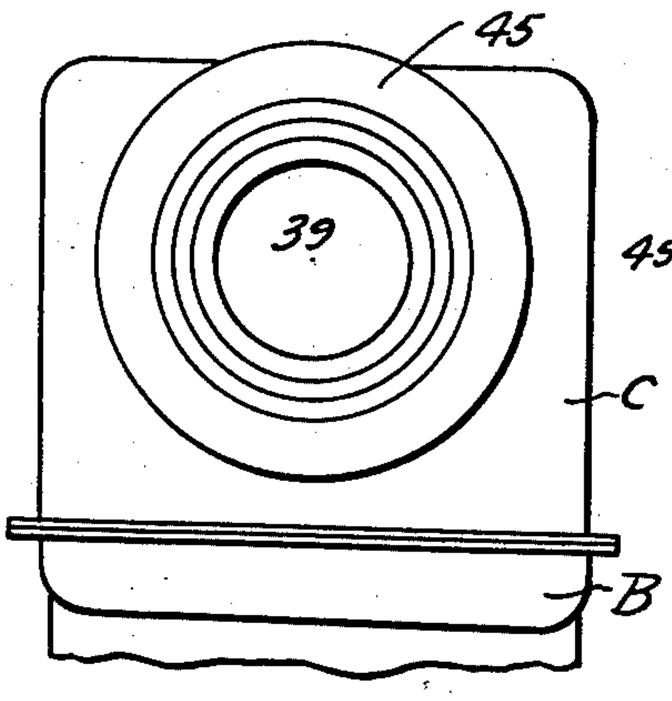


FIG. 7.

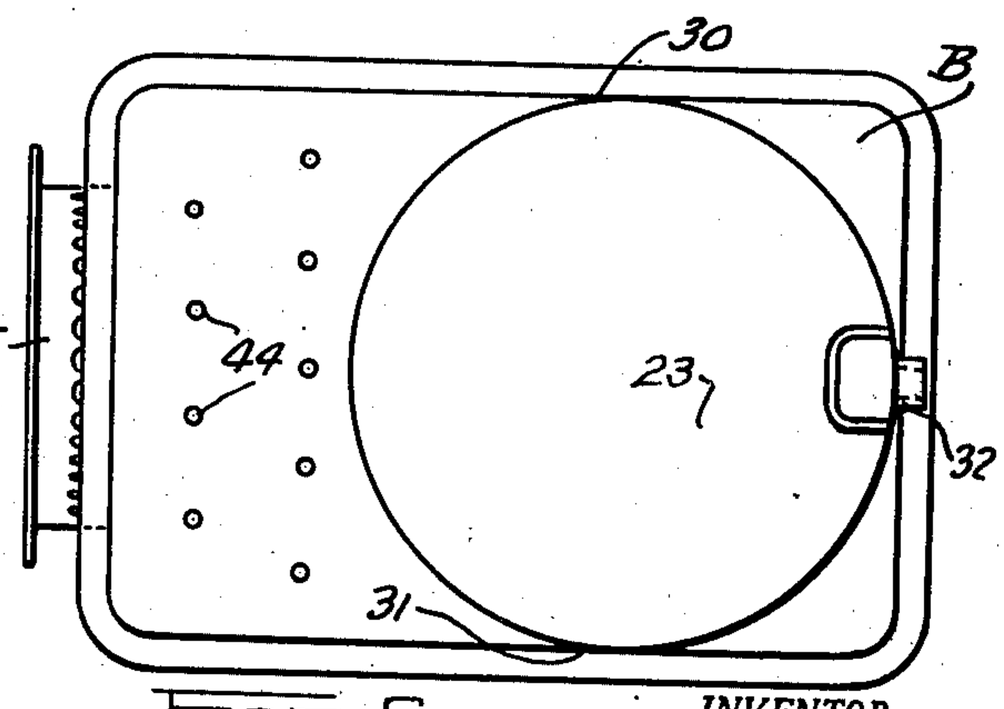


FIG. 6.

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VAPORIZING TYPE OIL BURNER

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Application August 15, 1947, Serial No. 768,762

3 Claims. (Cl. 158—91)

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This invention relates to combustion apparatus and more particularly to burners of the vaporizing type.

The principal object of the present invention is to provide a vaporizing burner of the type having a discharge opening at the side thereof, which is more efficient in operation than previous burners of this type.

A further object of the invention is to provide such a burner which is particularly simple and economical to construct.

These objects are attained in part by forming a generally elbow shaped burner in which the bottom end portion is substantially cylindrical and the discharge end portion is substantially rectangular in cross-section, and wherein the great majority of the primary air inlet openings are provided in two opposite planar faces of said portion of rectangular cross-section.

The objects are also attained in part by making the side wall of the burner of two one piece sheet metal stampings.

In the drawings:

Fig. 1 is a cross-sectional view of a burner embodying the present invention;

Fig. 2 is a cross-sectional view taken on substantially the line 2—2 of Fig. 1;

Fig. 3 is a side elevational view of the burner;

Fig. 4 is a plan view of the same;

Fig. 5 is a rear end elevational view of the burner;

Fig. 6 is a bottom view of the burner; and

Fig. 7 is a fragmentary front elevational view of the burner.

The burner shown in the drawings is particularly adapted for operation under a positive draft. It comprises an outer casing 10 and a burner proper 11. The outer casing 10 is preferably formed of sheet metal and comprises a bottom wall 12, a pair of identical side walls 13, only one of which is shown, a rear wall 14, a front wall 15, and a top wall 16. These walls are joined together in any suitable way, the joints therebetween preferably being air tight.

The side wall 13 is provided with a large opening 17 into which is inserted an air inlet duct or tube 18. Tube 18 extends across housing 10 and is provided with a slot 19 near the bottom and adjacent the burner. Slot 19 extends throughout a substantial portion of the length of tube 18 and directs the air across and beneath the bottom of the burner. This construction gives uniform distribution of air to the air inlet openings of the burner. Air under pressure, either forced draft or gravity, is supplied to the duct

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18 from a suitable source connected to the latter.

The front wall of the casing is provided with a discharge opening into which is inserted a flanged collar 20. The purpose of this collar will appear more fully presently. Another opening is formed in the top wall 16. This opening is covered by a bracket 22 and a hinged cap 21 hingedly connected to the bracket. The bracket is secured to the top wall and has an opening registering with the opening in the top wall 16 to provide access to the interior of the burner for lighting the same.

The burner proper is preferably composed of four sheet metal stampings A, B, C and D. Stamping A is in the form of a shallow circular pan which forms the bottom wall 23 of the burner. At one side of the bottom wall 23 a fuel inlet opening is formed to which a fuel conduit 24 is attached. Fuel is fed to the bottom wall of the burner from a source not shown through a conventional valve mechanism 25. The valve mechanism may be of any conventional sort by means of which the flow of fuel to the burner can be regulated.

The second stamping B comprises a part of the side wall of the burner proper. The stamping B consists of a lower cylindrical portion 27 and an upper rectangular portion 28. The lower cylindrical portion 27 telescopically engages the upper end of the bottom wall stamping A and is preferably seam welded thereto. Two vertically spaced rows of primary air inlet openings 29 are formed in the cylindrical portion 27 in zones spaced from the bottom wall of the burner. The upper rectangular portion 28 of the stamping B is substantially as wide as the cylindrical portion 27 but is extended a substantial distance beyond the cylindrical portion at the front thereof. The two upright faces of the rectangular portion on opposite sides of the burner are tangent to the cylindrical portion 27 of stamping B at 30 and 31. Another upright face of the rectangular portion at the rear end of the burner is tangent to the cylindrical portion 27 at 32. The front upright face of the rectangular portion is spaced a substantial distance horizontally from the cylindrical portion 27. The entire top edge of the stamping B is provided with a horizontal peripheral flange 33. A row of primary air inlet openings 26 is provided in each of the two longer upright walls of the rectangular portion 28.

The third stamping C is a deeply drawn sheet metal structure having a vertical front wall 34, a pair of parallel vertical walls 35 and 36, and a

fourth wall **37**. The wall **37** extends rearwardly from the top of the front wall **34** and curves rearwardly and downwardly to meet the upper rear edge of the rectangular portion **28** of the stamping B. The stamping C is provided with a peripheral flange **38** about its lower edge which registers with the flange **33** on the second stamping.

A large number of primary air inlet openings **42** are formed in the two parallel planar faces **35** and **36**. The openings **42** are relatively uniformly distributed throughout the extent of the faces **35** and **36**. A relatively small number of auxiliary primary air inlet openings **43** are formed in the curved wall **37** at the rear end thereof. These openings are relatively uniformly dispersed throughout a narrow vertically extending zone located midway between the faces **35** and **36**. It will be noted from Figure 5 that these openings **43** are relatively remote from the faces **35** and **36**.

A very few primary air inlet openings **44** are formed in the bottom of the rectangular portion **28** of the second stamping in the zone between the cylindrical portion **27** thereof and the front edge of the burner. As shown, there are nine of these openings.

A discharge opening **39** of circular shape is formed in the front wall **34**. A tube **40** is connected to the wall **37** surrounding a circular opening therein and is inserted into the opening in the bracket **22** to provide access to the burner to light the same.

The fourth stamping D consists of a collar **45** of Z-shaped cross-section. The collar **45** surrounds the discharge opening **39** in the end wall **34** of the burner proper and is secured to said end wall. The collar **45** also telescopes over the collar **20**, as indicated in Fig. 1, and is secured by suitable means to the front wall **15** of the casing **10**. The collar **45** is of an axial extent sufficient to space the front wall **34** of the burner proper away from the rear axial extremity of the collar **20** so as to provide a narrow annular slot **46** through which secondary air can reach the fuel vapors and air issuing from the burner. The secondary air gains access to the slot **46** through a plurality of closely spaced relatively large secondary air inlet openings **47** in the collar **45**.

A partition **48** is mounted in the burner relatively close to the bottom wall thereof but above the lowermost row of primary air inlet openings **29**. The partition **48** has a large central opening **49** therein through which fuel vapors, and such air as is admitted through the lowermost row of openings **29**, can pass into the upper portion of the burner. The partition **48** is mounted within the burner by means of a plurality of bosses **50** which are pressed inwardly from the sheet metal of stamping B.

In a general way the burner described operates in a conventional manner. Liquid fuel is admitted through the valve **25** and conduit **24** to the bottom wall of the burner. It is ignited by any suitable means inserted through the tube **40** after the cap **21** is lifted and for a relatively short time combustion occurs adjacent the fuel inlet. Air for combustion is forced into the casing **10** and then into the burner proper through the air inlet openings in the walls thereof. When the rate of fuel flow is very small, sufficient air for combustion of the fuel is supplied through the lower row of openings **29**. Hence, at this stage combustion occurs, generally speaking, below partition **48**. If the fuel supply is increased the fuel will vaporize at a rate greater than can be consumed

in the bottom of the burner so that the flame will rise through the opening **49** where additional air is provided through the upper row of openings **29** and the openings **42**. Eventually, if sufficient fuel is fed to the burner, the fuel is vaporized and mixed with air within the burner and little or no combustion occurs within the burner. At that stage combustion is initiated at the discharge opening **39** where the secondary air is admitted in quantities sufficient to completely consume the fuel vapors.

When the burner is operating at its higher stages of combustion, the pre-mixing of the fuel vapors and air is facilitated by means of the exceptionally large volume of the upper portion of the burner proper. This increased volume is due primarily to the rectangular cross-sectional configuration thereof. The rectangular configuration is particularly efficient also, not only because of the increased volume, but because the inlet openings **42**, being formed in two opposite plane faces thereof, can be located relatively close together without interference between jets or air entering through adjacent openings because such jets will be substantially parallel and non-converging. In previous burners having round side walls the jets of air entered in a radial direction and unless placed relatively far apart would converge and impinge upon each other, causing a smoky yellow flame.

The major portion of the primary air inlet openings are the openings **42** in the planar faces **35** and **36** of that portion of the burner of rectangular cross-section and the openings **26** in the two long sides of the rectangular portion **28**, which are also planar. These openings have a larger total area than that of the remaining primary air openings. It has been found to be desirable, however, to provide a relatively few inlet openings, such as the openings **43** and **44**, in order to prevent a somewhat stagnant condition of heavy fuel vapors, particularly adjacent the bottom of the rectangular section near the front wall **34**. These openings **43** and **44** are relatively few in number and are spaced far enough from the two faces **35** and **36** so as to completely prevent interference between the jets entering the various primary air inlet openings.

In addition to improving the efficiency of vaporizing burners of the type having a lateral discharge opening, the rectangular configuration of a portion of the burner facilitates the manufacture of the burner. As has been pointed out above, the burner can be made of not more than four stampings. It is possible to combine the stampings A and B into one integral piece. It is preferred to make this in two pieces, however, in order that the stamping A can be made of heavier gauge material than is required for the rest of the burner.

From the foregoing it will be seen that the present invention provides an exceptionally efficient burner of the vaporizing type which can be easily fabricated and assembled.

I claim:

1. A vaporizing burner comprising a bottom wall adapted to serve as a fuel receptacle, a tubular side wall in the form of an elbow secured to said bottom wall and extending upwardly and laterally therefrom, a substantially vertical end wall connected to the lateral portion of said side wall remote from said bottom wall and having a relatively large discharge opening therein, the upwardly extending portion of said tubular side wall adjacent the bottom wall being cylindrical

and the laterally extending portion of said side wall above said cylindrical portion and adjacent said end wall being generally rectangular in cross-section and having two opposite parallel vertical planar wall portions provided with a plurality of spaced apart parallel air inlet openings therein whereby air entering said burner through said parallel inlet openings takes the form of substantially parallel jets, said cylindrical portion having a plurality of converging air inlet openings therein whereby air entering said burner through said openings takes the form of converging jets, a minor portion of said air inlet openings being formed in said cylindrical portion and a major portion of said air inlet openings being formed in said two opposite parallel vertical planar wall portions of said laterally extending portion of said side wall, the said major portion of the air inlet openings having a greater total area than that of the said minor portion of the air inlet openings.

2. A burner as defined in claim 1 wherein a centrally apertured partition extends transversely of said side wall intermediate said bottom and end walls, and is mounted on said side wall.

3. A burner as defined in claim 1 wherein the said two opposite parallel vertical planar wall portions containing the majority of said air inlet openings are tangent to said cylindrical portion.

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