Jan. 5, 1932. J. P. DOBBINS 1,839,655

FLAME ARRESTER

Filed July 20, 1929

FIG. 1

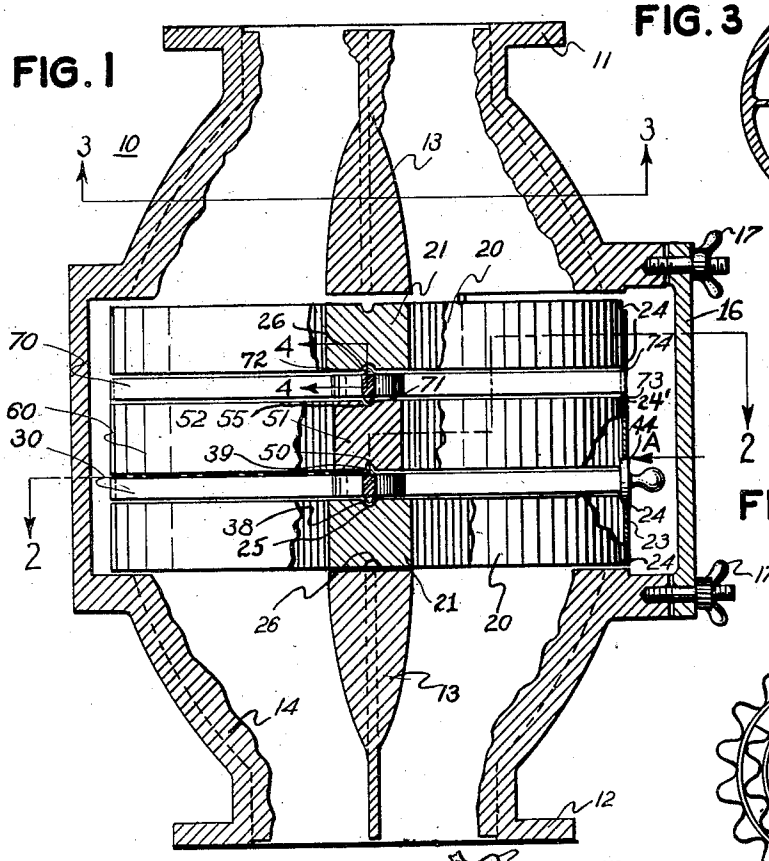


FIG. 3

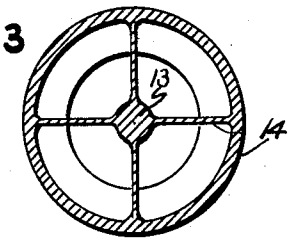


FIG. 4

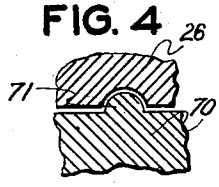


FIG. 5

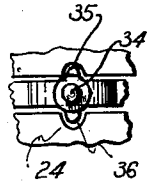


FIG. 6

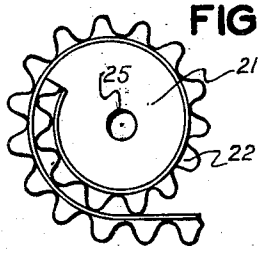


FIG. 2

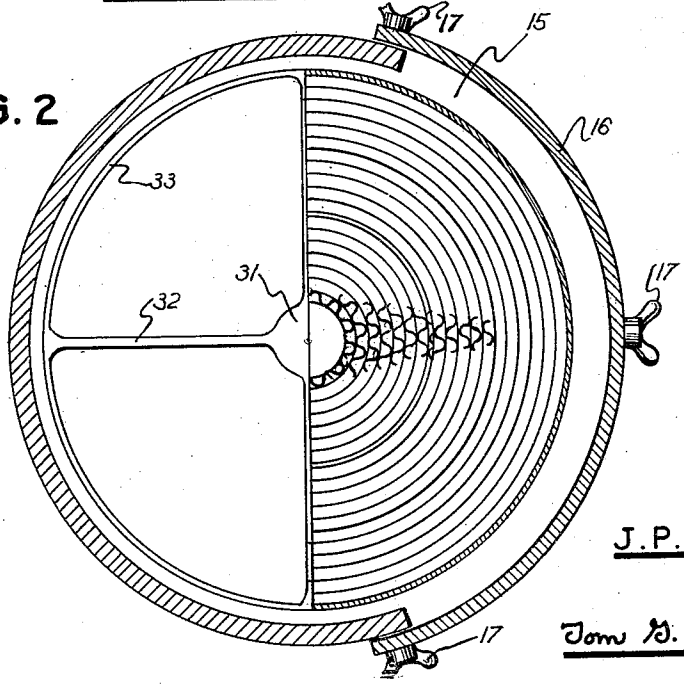


FIG. 7

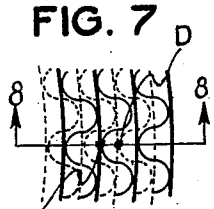
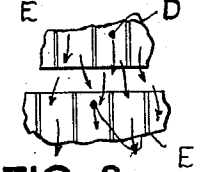


FIG. 8



Inventor

J. P. DOBBINS.

Tom B. Bomar. Attorney

Patented Jan. 5, 1932

1,839,655

UNITED STATES PATENT OFFICE

JOHN P. DOBBINS, OF TULSA, OKLAHOMA

FLAME ARRESTER

Application filed July 20, 1929. Serial No. 379,796.

This invention pertains generally to the elimination of flame by means of the dissipation of the heat evolved by the combustion. More particularly, my device relates to flame arresters which are installed in connection with the vents on storage tanks containing volatile liquids.

One objection of flame arresters on the market today is that they retard the flow of the gases therethrough. Of course, retardation cannot be entirely prevented as it is necessary to bring the flames into contact with a large surface area in order that the metal, preferably aluminum, may absorb the heat therefrom and hence quench the flame.

One principal objection to flame arresters on the market today lies in the fact that they do not retard or damp out the flame under all conditions. In other words certain atmospheric conditions or phenomena cause the flame arresters to fail to function properly and thus the flame passes through and sets fire to the tank of volatile fluid such as oil.

Another objection to some flame arresters is that they are so constructed as to cause all gases and the like traveling or passing therethrough to follow a tortuous passageway with the expected loss of capacity and efficiency.

One theory concerning the operation of flame arresters is that the small particles or atoms of the gas come in contact with the heat conducting surfaces of the arrester and thus lose their heat. The particular amount of movement of the atoms in a gas is dependent upon the temperature of the gas as well as many other variable factors. These other factors, in turn, are dependent upon weather conditions and one theory relative to the non-operation of these flame arresters in certain kinds of weather is that the impingement of the atoms against the heat conducting surfaces is not frequent enough.

It is my idea to inventively construct a device which will function under all conditions. I do this by causing a sort of turbulent flow to occur which precludes the possibility of a "bunch" or spurt of flame slipping through the arrester without coming into contact with some of the partitions therein and losing its heat. In other words, a considerable quantity of flame cannot pass through my arrester in a straight line.

It might be said that convection controls the heat loss of the flame with its consequent extinction rather than conduction and I aid the former process by causing the flame to pass close to the heat carrying away surfaces.

My structure for accomplishing the herein recited objects may be constructed in several ways.

One form consists of placing several tube banks in misaligned fashion. Another form consists of aligning several tube banks but placing them a little distance apart whereby turbulent flow will be produced. Or, if desired, the tube banks may be both separated by spacers and also misaligned.

It will be noted that the total cross sectional opening is not restricted in my improved flame arrester over the ordinary single tube bank type of arrester.

Another advantage of my invention lies in the fact that I use a number of tube banks. Thus, when one tube bank becomes defective or dirty, it may readily be replaced. Furthermore, I provide a cover plate which may be quickly removed when inspection or replacement of a bank is necessary.

I also provide means for keeping my tube banks, as well as the spacers therebetween, when used, in alignment, and these spacers serve to keep the two banks apart whereby the end areas of the same may be utilized as heat conducting surfaces.

Other objects will appear, or become apparent or obvious, or will suggest themselves during the description of the apparatus shown in the accompanying drawings in which:

Fig. 1 is a cross-sectional view through the main body or casing and certain other parts have been broken away, in order to expedite the showing.

Fig. 2 is a view taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional taken along the line 3—3 of Fig. 1.

Fig. 4 is a view taken along the line 4—4 of Fig. 1, showing one of the central aligning lugs or projections.

Fig. 5 is a view looking the direction of the arrow A, in Fig. 1.

Fig. 6 is a diagrammatic plan view showing how my tube banks may be constructed.

Fig. 7 is a view showing one tube bank superimposed on a lower tube bank.

Fig. 8 is a view taken along the line 8—8 of Fig. 7.

Referring with particularity to the drawings, 10 indicates the casing or body member with standard companion flanged connections, 11 and 12, at the ends thereof. Each end of this body member has a central core 13, with radical webs or fins 14, extending therefrom. The lower set of webs or fins are in alignment with the upper set and thus a minimum of resistance is offered to the passage of the gases therethrough. The cores and fins tend to spread out the gas from its entering condition of stream line flow and to diffuse or scatter it equally over the entire opening.

At this point it might be noted that the body member and the tube banks are preferably formed of some metal having a high conductivity of heat.

The body member 10 has an opening 15, which is of such size as to allow the tube banks and the spacers therebetween to be placed into and removed from their positions in the body member. A suitable cover member 16, is held in place by means of the winged nuts 17, and renders the casing gas or air tight.

Any number of tube banks and a one less number of spacers may be used in connection with my improved device, or the tube banks may be used without spacers, but as shown in the drawings, see Fig. 1, there are three tube banks and two spacers.

The lowest tube bank, designated by the numeral 20, and the highest tube bank, also designated by the numeral 20, since it is identical in structure therewith, are formed of a central member 21, a corrugated strip of heat conducting metal webbing or the like 22, wound therearound, and a circular band 23, around the outer periphery to hold the webbing in place. This band 23 has notches 24 cut therein, the purpose of which will later be set forth.

The central member 21 has a central hole or indentation 25, in its upper surface and another aligning hole 26, in its lower surface. In the bottom, or lowest, tube bank the aligning hole 26 does not function as the central member 21, rests upon the core 13.

A spacer 30 consists of a central core 31, a number of radial arms 32, and an outer band 33. A handle 34, having lugs 35 and 36, is fastened to this outer band 33, and provides a means for removing the entire bank of tubes when it is desired to replace or inspect the same. The depending lugs 35 and 36 rest in the notches or slots 44 and 24, respectively, and thus maintain the several banks of tubes and spacers in alignment.

The spacer 30 has lugs 38 and 39, on its central core 31, and the lower lug 38 rests in the opening 25, in the lowest tube bank, and thus keeps the spacer and the tube bank in alignment. Similarly, the upper lug 39 rests in the opening 50, of the core member 51, of the central tube bank, which is designated by the numeral 60. This central tube bank 60, has a bank or heat conducting webbing similarly formed to that set forth in the tube bank 20, but it is to be noted that the openings in one tube bank are offset radially to the openings in the other tube banks. This is due to the fact that the core or central portion 51, is slightly smaller in diameter than the core or central portion 21 of the tube bank 20.

Referring to Figs. 7 and 8, it will thus be seen that the center line of flow of the portion of a gas which passes through one of the tubes will have to shift each and every time that it leaves one bank of tubes and passes into the next bank of tubes. For instance, D indicates the center line of flow of a quantity of gas through one duct or tube in an upper tube bank, and E indicates the center line of flow of the same gas through the tube in the next lower bank of tubes. Of course, the gas does not act in such an orderly fashion, but the major portion of it must shift itself relatively to the walls of the passageway through which it is travelling, as it goes from one tube bank to the other. That is to say, there will be very little "stream line flow" and hence all of the gas and flame will tend to lose its heat by direct contact with the walls of either the body member or the tube banks. Further, the lack of "stream line flow" allows the heat to distribute itself through the gas by means of convection, rather than by conduction.

Another spacer member 70, with lugs 71 and 72, rests upon the tube bank 60, and supports the upper tube bank 20. The lug 71 rests in the opening 55, in the central portion 51, of the tube bank 60, and the upper lug 72 rests in the opening 26, in the portion 21. The spacer 70 also has lugs 73 and 74 on its outer rim, which rests in slots or notches 24′ and 24 respectively, and thus keeps these members in alignment.

Although a particular embodiment of the invention has been illustrated and described in order to comply with the terms of the patent statutes, it is not intended that the invention shall be limited to said particular embodiment since the invention may be applied to other forms without departing from its spirit.

What I claim is:—

1. A flame arrester comprising a body member having an opening entirely therethrough, two misaligned tube banks in said opening, the tubes in each bank being parallel

to the axis of the opening, and means for maintaining the tube banks spaced from each other.

2. In a device of the character described comprising a hollow body member, two tube banks mounted therein and means for holding the tube banks in misaligned relationship.

3. A flame arrester comprising, a vertical hollow body member, two or more tube banks, and means for spacing the tube banks in vertically disposed spaced relationship to each other whereby agitation of burning gases may occur therebetween.

4. A flame arrester comprising a vertical hollow body member, two tube banks, and means for spacing the tube banks in vertically disposed relationship to each other and also maintaining the tube banks in misalignment with each other.

5. In a device of the character described comprising a hollow body member, three tube banks located therein and spacer members between the respective tube banks whereby they are held apart from each other.

6. A flame arrester comprising a hollow body member, three or more tube banks, spacers between the several tube banks and means for maintaining each of the sets of opposed tube banks on opposite sides of each spacer in misalignment.

In testimony whereof I affix my signature.

JOHN P. DOBBINS.