Oct. 26, 1937. P. HEFTLER 2,097,279

BACKFIRE TRAP

Filed March 11, 1936

Fig. 1.

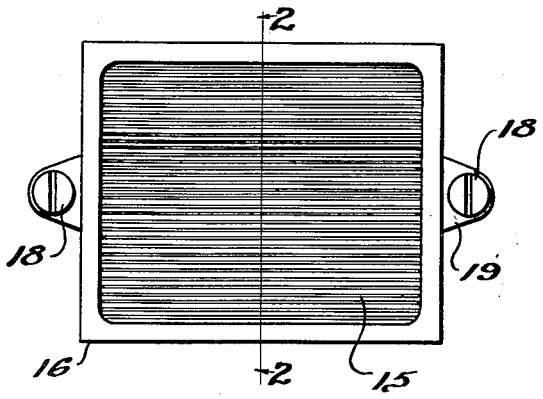
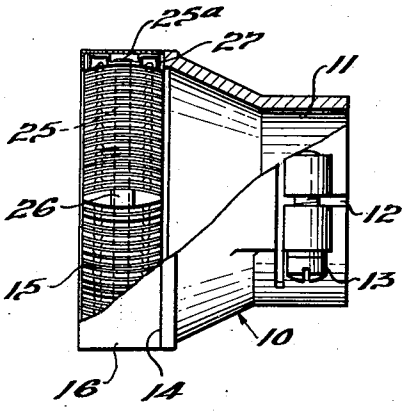


Fig. 2.



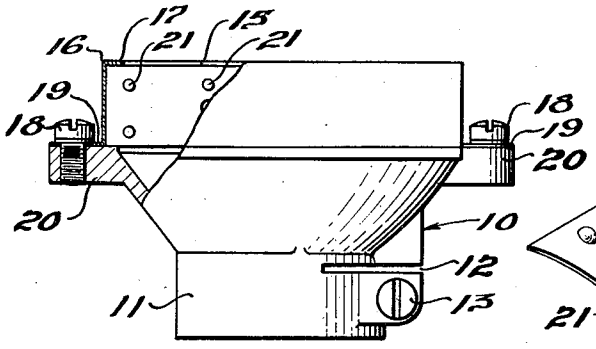


Fig. 3.

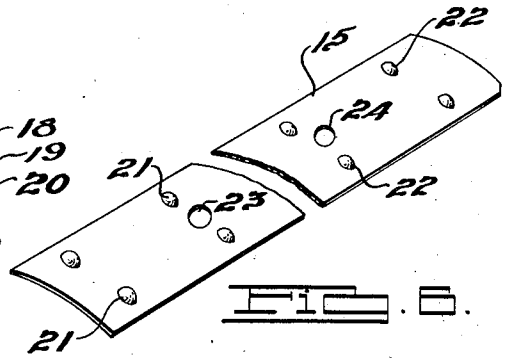


Fig. 5.

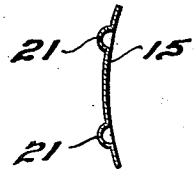
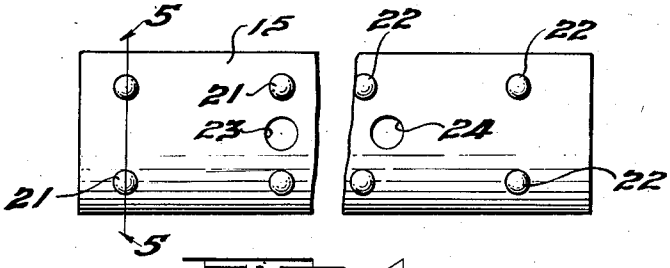


Fig. 4.



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BACKFIRE TRAP

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7 Claims. (Cl. 123—142)

This invention relates particularly to backfire traps, that is, devices to prevent flames from escaping from the intake of a carburetor of a gasoline engine when a backfire occurs, and, more generally, to the entire field of devices for allowing a gas to flow while preventing the passage of flame.

Backfire traps are particularly desirable on carburetors of marine engines because such engines are placed low in the hull of a boat, generally as low as possible, and are often enclosed and poorly ventilated, with the result that if there is any leakage of gasoline, it evaporates and forms an explosive or exceedingly combustible mixture in the bilge of the boat and around the engine. A backfire escaping from the carburetor under such conditions is apt to cause an explosion or a fire in the bilge, and, to prevent this, backfire traps are required by the underwriters.

In the design of backfire traps, a number of features are sought. The metal with which the flame is brought into contact to be cooled and extinguished must have enough mass to be able to absorb most of the heat from the exploding gases passing out of the backfire trap and not become hot. The metal must be arranged so that every particle of the exploding gas passing through the trap is near enough to the metal for a long enough time to be cooled off below the ignition point. The metal must also be arranged so as to present the minimum resistance to the flow of air into the carburetor. These conditions are best met by a plurality of wide, thin, closely and uniformly spaced metal plates, but such an arrangement has hitherto proved to be impractical because, prior to this invention, no way has been known to satisfactorily support such thin plates without unduly obstructing the slots between them with a multiplicity of crosspieces, washers, or other structural members.

Until the advent of the present invention, probably the most satisfactory solution of the problem of efficiently arranging the heat absorbing metal of a backfire trap consisted of a flat strip and a transversely corrugated strip placed one upon the other and wound up spirally together to form a disc whose thickness equaled the width of the strip. The corrugated strip spaced the successive layers of flat strips and provided passages for gas or air from one side to the other of the disc formed by the spirally wound strips. The disadvantages of this construction are, firstly, that where the peaks of the corrugations of one strip touch the flat surface of the other strip there are two or three thicknesses of metal in contact, with only two surfaces exposed to absorb heat, and, secondly, that at points just adjacent the peaks of the corrugations the gas passages are so narrow that not enough of the flame can pass through at those points to efficiently utilize the heat absorbing capacity of the metal. These disadvantages cannot be avoided by employing thinner metal because then in some places, where there is only a single thickness of metal between two full width gas passages, there would not be enough heat absorbing capacity in the partition.

One of the principal objects of the present invention is the provision of a new form of backfire trap element which avoids the disadvantages discussed above, and which consists of thin sheets of metal of the proper width and thickness supported securely and spaced uniformly at the proper distance apart.

Another object of the present invention is the provision of a backfire trap in which the air passages are not straight through, so that gases passing at high velocity through the trap are directed against the surfaces of the blades and more effectively cooled.

Fig. 1 is an elevation of the face of the backfire trap.

Fig. 2 is a side elevation with parts broken away and shown in section on the lines 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a bottom view.

Fig. 4 is a plan view of one of the blades forming the flame quenching element.

Fig. 5 is a section view taken on the line 5—5 of Fig. 4, taken in the direction of the arrows.

Fig. 6 is a perspective view of the blade shown in Fig. 4.

The embodiment of the invention illustrated in the drawing comprises a funnel-like body 10, which may be of cast iron, and whose smaller end is formed into a cylindrical sleeve or neck 11. The sleeve 11 is adapted to fit over the air intake of a carburetor and is provided with a T-shaped slot 12 and a clamping screw 13 by means of which it can be secured in place.

The other end of the body 10 is machined to provide a flat rectangular rim 14 against which is secured a nest of blades 15 forming a heat absorbing assembly which does the actual quenching of any flame that might otherwise escape from the carburetor. The assembly of blades 15 is held in place by a sheet metal frame 16 which surrounds the assembly and has a narrow flange 17 extending over the edge of the face of the as-

sembly. The frame 16 is fastened to the body 10 of the backfire trap by a pair of screws 18 extending through lugs 19 on the side of the frame into lugs 20 on the body 10 of the trap.

The blade assembly comprises a large number of long, thin, sheet metal blades 15 curved from edge to edge and evenly spaced apart by integral bosses 21 and 22. The blades 15 are each provided with two symmetrically placed holes 23 and 24 which allow them to be stacked up on a pair of rods 25. The blades are all alike, so that they may be produced in a single set of dies, but the bosses 21 and 22 are not symmetrically located about the center of each blade. Then, when the blades are stacked, each blade is turned end for end with respect to the blade below it, and the bosses of one blade do not fit into the bosses of the other but serve to space the blades. In the particular embodiment of the invention illustrated, the bosses 21 in one half of the blade are a little nearer the end of the blade than the bosses 22 in the other half, but any arrangement of bosses in which lines passing through and bisected by the center of the blade have a boss at only one end will be non-nesting and will space the blades.

In practice, it has been found desirable to have a symmetric arrangement of blades 15. This is provided by stacking them on the rods 25 in two groups, one at each side of a central spacing member 26, with the concave sides of the blades in one group facing the concave sides of the blades in the other group. Outer blades 27 of special shape, each having one face arranged to fit against the convex outer edge of the groups of curved blades 15 and having the other face generally flat, are provided at the top and bottom of the blade assembly to make it fit the retangular frame or housing 16, and the ends 25*a* of the rods 25 are lightly riveted over to hold the blade assembly together.

With the above construction, a backfire trap can be made with uniformly spaced blades only one hundredth of an inch thick and spaced as close as twenty-four to the inch without offering appreciable resistance to the flow of air, whereas, if flat blades are used, they must be made four times as thick to be sufficiently rigid to be practical in service, or else must be supported at very closely spaced points, either of which alternatives will seriously obstruct the flow of air and increase the cost of manufacture.

While only one form of the invention is shown in the drawing and described above, numerous modifications or other embodiments of the invention can be made which will be based to some extent upon the teachings of this disclosure. For instance, the transverse curve of the blades may be an ogee curve or may consist of two or more flat or curved sections at a slight angle to each other, instead of being an arc of a circle as shown, although these forms are probably not as good as the one shown; or washers or other spacers may be used to separate the blades instead of the bosses 23 and 24. The invention is, therefore, not only the above described modification, but also any structure falling within the terms of the following claims.

I claim:

1. A flame arrester comprising a plurality of shallow trough-like strips of sheet metal, the strips being nested but spaced from each other to provide narrow passages between them and the edges of each strip being continuous.

2. A flame arrester comprising a plurality of narrow strips of sheet metal curved from side to side to increase their rigidity and secured in a stack with spaces between them to provide narrow slots extending from one side of the stack to the other, the cross-section of each of the strips being substantially the same from one end of the strip to the other to provide substantially the same strength and rigidity throughout its length.

3. A flame arrester comprising a large number of shallow trough-like strips of sheet metal arranged in a stack with the edges of the strips defining the faces of the stack, the strips being arranged with the convex side of one strip facing and spaced from the concave side of the adjacent strip so as to provide a plurality of thin slots of uniform thickness extending from one face of the stack to the other, the cross-section of each of the strips being substantially the same from one end of the strip to the other to provide substantially uniform rigidity and strength throughout its length.

4. A flame arrester comprising a large number of shallow trough-like strips of sheet metal arranged in a stack with the edges of the strips defining the faces of the stack, the strips being arranged with the convex side of one strip facing and spaced from the concave side of the adjacent strip so as to provide a plurality of thin slots of uniform thickness extending from one face of the stack to the other, the strips being arranged in paired groups placed symmetrically about an axis perpendicular to the faces of the stack and the convex sides of the strips in one group of a pair facing in the opposite direction from the convex sides of the strips in the other group of the pair.

5. A flame arrester as described in the preceding claim in which the convex sides of the strips face away from the axis of symmetry.

6. A flame arrester comprising an air conduit having one end adapted to be secured to the air intake of a carburetor and having a rectangular opening at the other end and a heat absorbing element secured across said rectangular opening, said heat absorbing element comprising a large number of closely spaced strips of sheet metal extending across and edge-on to the opening, the strips being curved from side to side to increase their rigidity and being arranged symmetrically about the axis of the conduit to cause the air flowing between them into the conduit to flow symmetrically in the conduit.

7. A flame arrester comprising an air horn having an opening at one end adapted to be secured to the air intake of a carburetor and having a larger rectangular opening at the other end, and a plurality of closely spaced strips of sheet metal extending across and edge-on to the opening, the strips being curved from side to side and having their concave faces towards the center of said rectangular opening.

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