

May 12, 1959

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2,886,249

APPARATUS FOR DISPENSING AND DISPERSING FLUENT
MATERIAL SUCH AS AN INSECTICIDE

Filed Dec. 31, 1957

2 Sheets-Sheet 1

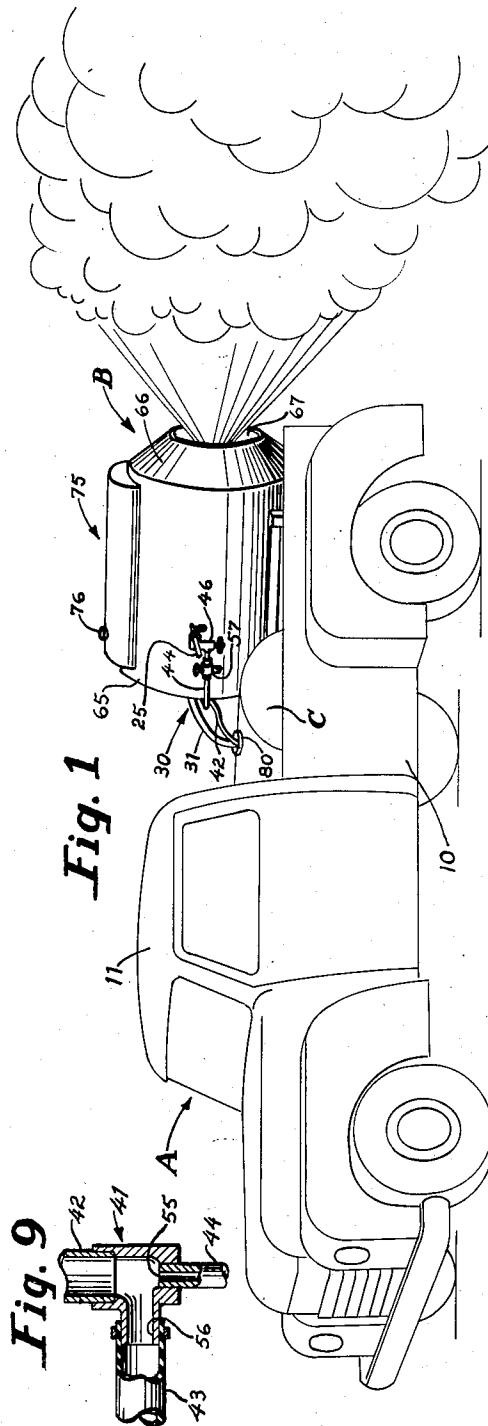


Fig. 1

Fig. 3

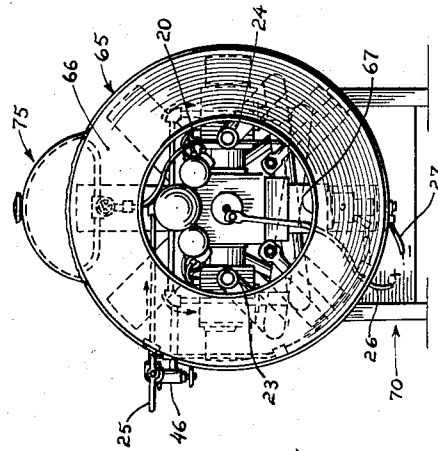
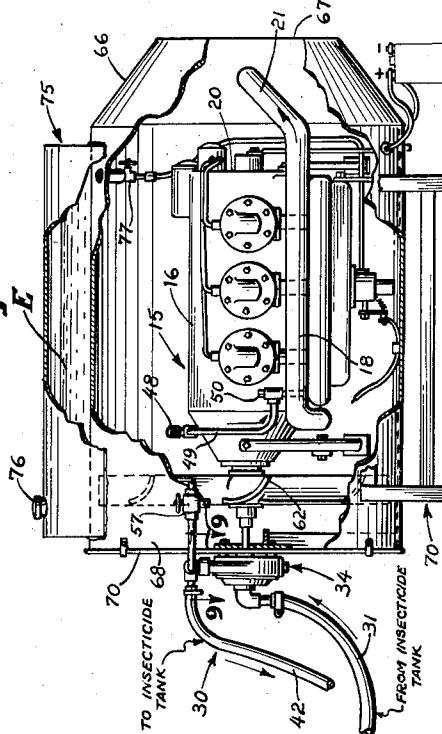


Fig. 2



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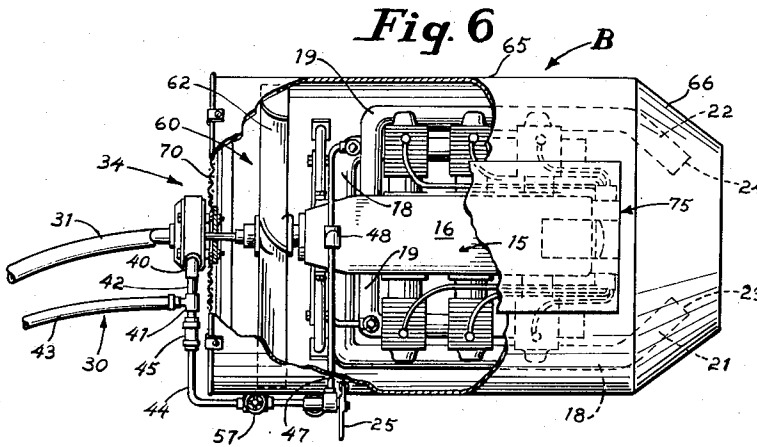


Fig. 4

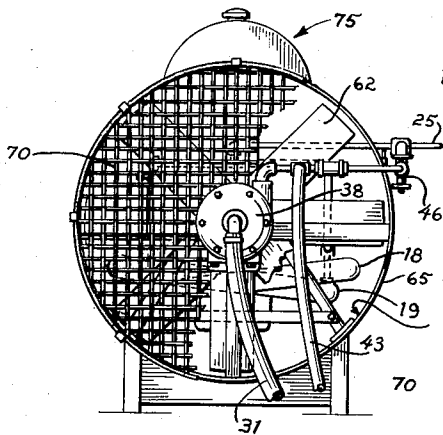


Fig. 5

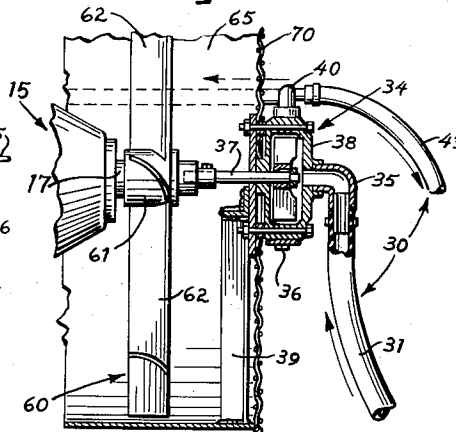


Fig. 8

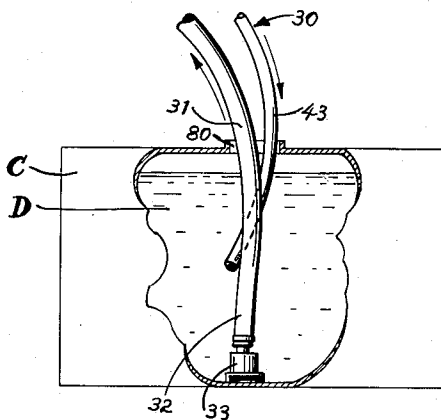
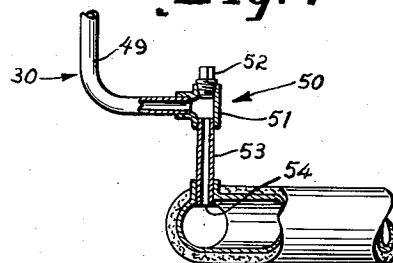


Fig. 7



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1

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APPARATUS FOR DISPENSING AND DISPERSING FLUENT MATERIAL SUCH AS AN INSECTICIDE

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Application December 31, 1957, Serial No. 706,359

8 Claims. (Cl. 239—77)

This invention relates to apparatus for dispensing and distributing fluent materials, such as insecticides for example, mixed with the exhaust gases of an internal combustion engine contained within a wind tunnel and the mixture which is discharged therefrom being propelled by air blasts set up by fan means.

An important object of the invention is to employ an internal combustion engine of the air-cooled type, and direct the air blasts set up by the fan over the engine housing in order to cool the engine, prior to actions of the blasts in propelling the ejected mixture as a fog or spray. I have discovered that this tends to cool the engine as well as propel the mixture.

An additional important object is to employ a wind tunnel as stated above and dispose the fan at the air inlet end of the tunnel, rather than at or adjacent the exhaust end thereof, because the ejected mixture tends to coat and impede the fan if the latter is disposed at or adjacent the exhaust end of the tunnel.

Furthermore, an important object of the invention is to protect the fan from damage and the operator from injury by disposing a suitable screen, as of wire mesh, over the air intake end of the air tunnel adjacent the fan therein. Should the fan be located within the tunnel at the exhaust end thereof and a screen be placed at this latter end, and ejected mixture forced through the screen would soon clog the mesh of the screen.

Yet another important object of the invention is to inject fluent material, as insecticide, under pressure, into the exhaust manifolds of an aeroplane-type internal combustion engine at locations adjacent the intake ends of the manifolds, rather than adjacent the middle or exhaust ends of the manifolds, thus taking advantage of a longer passage through the manifolds despite the faster passage due to pressurizing the insecticide, whereby the insecticide, which may, and frequently does, contain vaporizable material, is well heated for vaporization thereof.

Still another important object is to bleed or recycle a portion of the fluent material, by means of the pump which pumps and pressurizes the fluent material for injection into the manifolds, so that the recycled material will tend to agitate the fluent material within its reservoir.

A further object is to provide a wind tunnel surrounding an engine.

Other objects and advantages of the invention will be apparent during the course of the following detailed description of the invention, taken in connection with the accompanying drawings, forming portions of this disclosure and in which drawings:

Fig. 1 is a perspective view of the fluent material dispensing and distributing apparatus mounted upon a vehicle and connected with a source of fluent material supply, with the apparatus in operation.

Fig. 2 is a view of the apparatus, mainly in side elevation of the apparatus removed from the vehicle, portions of a wind tunnel housing being broken away to better disclose the structure beneath.

2

Fig. 3 is an elevation of the fluent material discharge end of the apparatus.

Fig. 4 is an elevation of the air intake end of the apparatus, with a portion of a screen broken away in order to disclose portions of the structure beyond.

Fig. 5 is an enlarged view, largely in vertical section, of a pump and its connections at the air intake end of the apparatus.

Fig. 6 is a view partly in top plan of the apparatus but with the wind tunnel housing broken away in order to reveal some of the structure within.

Fig. 7 is an enlarged fragmentary section of a connection between a fluent material supply conduit and an exhaust manifold.

Fig. 8 is a fragmentary vertical section through a container for a supply of fluent material and showing a fluent material exit and return conduits therein.

Fig. 9 is a vertical section, substantially on the line 9—9 of Fig. 2, of a T-coupling connected with the return conduit of Fig. 8.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views, the letter A designates a support; B, the apparatus for dispensing and distributing fluent material; C, a container for fluent material; D, fluent material; and E, fuel for an engine.

The support A may be any suitable one, preferably one whereby the apparatus B may be moved about, as required. In the example shown in Fig. 1 it is a conventional motor truck having a conventional chassis floor and side walls 10 extending upwardly therefrom and rearwardly of a cab 11.

Mounted upon the support A, as upon the floor boards thereof is the apparatus B for dispensing and distributing fluent material. This means B includes a fuel-burning engine, such as a conventional internal combustion engine 15 of the aeroplane type, having an engine housing 16 provided with a drive shaft 17 extending outwardly thereof and forwardly toward the cab 11, and two exhaust manifolds 18 and 19 which, of course, operatively open to the engine cylinders as is well known and extend from the sides of the housing 16. Each manifold is elongate and extends from the sides of the housing adjacent the forward or shaft end thereof, to then bend into double elbows and pass to the opposite side of the engine housing to extend therealong and rearwardly to locations rearwardly of the rear end 20 of the housing. The rearward end portions 21 and 22 respectively of the manifolds 18 and 19 then are bent to extend toward the longitudinal axis of the housing, substantially as shown in Figs. 2 and 6, where each opens to a discharge mouth or nozzle 23 or 24, as the case may be, facing away from the drive shaft 17. This provides two greatly elongate exhaust manifolds for passage of fluent material D and the heated products of combustion of the engine 15 therethrough and out of the mouths 23 and 24. For conserving loss of heat I prefer to cover the exterior surfaces of the exhaust manifolds with a suitable heat insulation material, as asbestos wrappings or coatings to form a part of each manifold. There is provided by this construction, long, relatively tortuous paths for the fluent material and products of combustion. If it were a matter of expediting the discharge of the products of combustion, the above construction would be detrimental but I have discovered that the paths I provide tend to heat the fluent material, which is generally desirable in order to vaporize it or volumes of it and mix it well with the products of combustion so that the fluent material does not emerge from the mouths 23 and 24 in more or less spaced-apart spurts. In order to provide readily accessible means to throttle the engine, I prefer to provide the throttle 25, shown in

Figs. 1, 3 and 6. Conventional electrical conductors 26 and 27 are provided for the ignition system of the engine.

Conveying means 30 for conveying the fluent material to and into the exhaust manifolds 18 and 19 include a conduit 31 extending from and into the container C to the bottom thereof, as shown in Fig. 8, where the intake end portion 32 of the conduit 31 ends in a conventional check valve 33. The conduit 31 extends to a conventional centrifugal pump 34 (Fig. 5), and is connected thereto as by an elbow coupling 35. The rotor 36 of the pump is preferably rotated by a shaft 37 operatively connected to the drive shaft 17 by way of the hub 61 of the fan to be subsequently described. The pump housing 38 may be mounted upon a suitable support 39 extending upwardly from the wall of the housing 65 of a wind tunnel to be later described. The discharge port of the pump opens into a suitable elbow coupling 40 which is connected to a T-coupling 41 by means of a conduit section 42. From one outlet portion of the coupling 41 extends a return conduit 43 for bleeding off a volume of the fluent material and returning it, under pressure, due to the pump 34, to the container C where the conduit 43 opens into the fluent material supply so that the bled pressurized fluent material will cause agitation of the fluent material within the container whereby, if the fluent material contains materials which tend to settle, the agitation will prevent this. From the other arm of the T-coupling 41 extends a conduit 44, in which is interposed a conventional check valve 45 to prevent back flow, and this conduit extends to a conventional valve 46 for manually regulating the flow of fluent material fed to the intake manifolds, and to manually shut off this flow. For convenience, the valve 46 is disposed at a location closely adjacent the throttle 25, exteriorly of the housing of the wind tunnel to be subsequently described. From the valve 46 a conduit 47 extends to a T-coupling 48 which may be positioned over the longitudinal axis of the engine housing. From one arm of the coupling 48 a conduit 49 extends to one of two similar fittings 50 best shown in Fig. 7, each of which fittings 50 comprises a T-coupling 51 with its two arms being substantially vertical disposed, and one arm closed by a removable screw plug 52 and the other arm opening to one end of a short conduit 53 which opens, at its other end, into an exhaust manifold either 18 or 19 as the case may be, at a location closely adjacent the juncture of the engine housing and the manifold. Not only does this provide for a longer passage of the fluent material through the heated manifold than would be the case if the fluent material entered the manifold intermediate its ends, but the fluent material, due to the turns in the manifolds from the locations of the fittings 50 to the discharge mouths 23 and 24 tend to baffle the fluent material so that it contacts the inner heated surfaces of the manifolds and tends to vaporize much better.

I have discovered that incrustations or deposits of solid products of combustion after a time form at the discharge mouth 54 of the conduit 53 where it opens into the manifold. This may be removed readily by unscrewing the plug 52 and inserting a stout wire, for example, in order to dislodge the deposit.

In connection with the bleeding off of a volume of the pressurized fluent material, this may be accomplished by one of several expedients. I have shown, in Fig. 9, the T-coupling 48 as having outlets 55 and 56 respectively of different sizes, whereby the greater volume of the pressurized fluent material may be bled back into the container C, as has been described. It may be desirable at times to take off pressurized fluent material for use in a hose and nozzle for direct spraying. Therefore, I prefer to provide a manually operable hose valve 57 interposed in the conduit 44, so that a suitable hose can be attached thereto. With the valve 46 closed, and the valve 57 open, the fluent material will flow through the hose (not shown).

Dual-function means 60 to cool the engine 15 and to cause the fluent material and products of combustion discharged from the mouths 23 and 24 respectively of the exhaust manifolds 18 and 19 to form a fog or spray is shown as a fan, provided with a hub 61 and propeller blades 62 radiating therefrom. The fan is mounted upon and for rotation with the outer end portion of the drive shaft 17 between the engine housing 16 and the pump housing 38 and, consequently, remote from the mouths 23 and 24. The blades 62 are so disposed that air currents will flow over and about the engine housing and about the exhaust manifolds at the rearward end portions 21 and 22 thereof and outwardly beyond the mouths 23 and 24.

A housing 65 is provided about but spaced from the engine housing 16 and dual function means 60 and extends outwardly beyond the mouths 23 and 24 to provide a horizontally-disposed wind tunnel, open at both ends. From Fig. 2 it will be seen that from the forward open end the wall of the housing 65 projects rearwardly to form a cylinder but, at the rear end of this cylindrical wall there is a truncated conical wall portion 66 with its smaller open end facing rearwardly to form the rear extremity of the housing and providing an air-fluent material-products of combustions discharge mouth 67. It is within this portion 66 that the mouths 23 and 24 open. At the opposite, or larger-diametered air entry end 68 of the housing 65, I prefer to position a suitable guard means 70, as a wire screen mesh, over the end 68, secured, as by welding to the housing 65, with suitable openings for the shaft 37, which is fixedly secured to the hub 61 in any approved way.

Support means 70' for the housing 65 may be a cradle shown in Figs. 2, 3 and 4 and resting upon the floor boards of the support A.

The housing 65 compresses the air directed thereinto by the means 60 and there is also caused a swirling or rotation thereof so as to effectively cool the engine housing. I have discovered that the truncated conical wall portion 66 of the housing 65 in conjunction with the positions of the nozzle or mouths 23 and 24 as shown in Fig. 3, is especially effective in causing a fog effect, substantially as shown in Fig. 1, to cover a defined area, even when there is some wind blowing.

Rather than conventionally dispose a fuel tank for the fuel E for the engine 15 upon the support A, I provide it as a part of the apparatus B and mount it upon the upper portion of the wind tunnel housing 65 as may be seen more particularly in Figs. 1, 2 and 3. The fuel tank 75 may have an arcuate bottom wall to conform to the curvature of the housing 65 and have curved upper and side walls and end walls, a filler opening closed by a removable cap 76 and suitable conventional valved conduit means 77 to the conventional carburetor means of the engine. Disposed as the tank 75 is, no pump feed is necessary.

The container C for fluent material is shown as disposed between the cab 11 and wind tunnel housing 65 and has a suitable opening 80 for the conduits 31 and 43.

The fluent material D may be any suitable one or combinations. For example, for spraying to destroy mosquitoes and other insects, there may be employed 6% malathion and 94% diesel fuel oil, or 6% BHC (benzene hexachloride) and 94% diesel fuel oil. For a spray or fog for scale, there may be used 1½ gallons EP 90 oil (Du Pont) or 2 pounds zineb (zinc ethylene bis-dithiocarbamate) in 100 gallons water.

With the support A positioned so that the discharged fluent material will contact the area to be fogged or sprayed, the engine 15 will be started in operation, which will cause operation of the pump 34 and dual function means 60, fluent material D will be drawn from the container C and enter the pump, being pressurized therein so that a volume will be discharged under pressure into the exhaust manifolds and the rest bled back into

the container C under pressure. After passing through the manifolds, the fluent material will emerge from the mouths 23 and 24, vaporized and mixed with the products of combustion, to be discharged as fog or spray, due to the positions of the mouths, the shape of the housing portion 66 and the rotary air blasts.

Various changes may be made to the form of the invention without departing from the spirit of the invention or scope of the claims.

What is claimed is:

1. Apparatus for dispensing and distributing fluent insecticidal material including a support; an air-coolable internal combustion engine carried by said support and having a housing, a drive shaft extending from said housing, and an exhaust manifold extending from said housing provided with a discharge mouth facing away from said drive shaft; a source of fluent insecticidal material carried by said support; conveying means for conveying fluent insecticidal material from said source to and into said exhaust manifold to mix with and be heated by the products of combustion therein and be discharged from said mouth; and means carried by said support to cool said engine and to cause said fluent insecticidal material and products of combustion discharged from said mouth to form a fog, comprising a fan mounted upon said drive shaft at a location remote from said mouth to direct air around and over the exterior surface of said engine and in contact therewith and about the discharge end portion of said exhaust manifold at said mouth, and outwardly beyond said mouth.

2. Apparatus according to claim 1 characterized in that said exhaust manifold is elongate and said conveying means opens into said exhaust manifold at a location closely adjacent the juncture of said exhaust manifold and said housing.

3. Apparatus according to claim 2 characterized in that said conveying means includes a conduit having a mouth opening into said exhaust manifold at said location and also includes products of combustion clean out means, providing an opening from the interior of said conduit to the exterior thereof and axially aligned with said mouth of said conduit, and a removable closure for said opening.

4. Apparatus for dispensing and distributing fluent insecticidal material including a support; an air-coolable internal combustion engine carried thereby and having a housing, a drive shaft extending from said housing, and an exhaust manifold extending from said housing and provided with a discharge mouth facing away from said drive shaft; conveying means carried by said housing for conveying fluent insecticidal material to and into said exhaust manifold to mix with and be heated by the products of combustion therein and be discharged from said mouth; a wind tunnel housing carried by said support and surrounding said engine and manifold spaced therefrom and having an air entry open end and an air fluent insecticidal material-products of combustion discharge open end adjacent said mouth; and means to cool said engine and to cause said fluent insecticidal material and products of combustion discharged from said mouth to form a fog, comprising a fan mounted upon said drive shaft at a location closely adjacent said air entry open end to direct air upon, around and over said engine and about the discharge end portion of said exhaust manifold at said mouth, and outwardly beyond said mouth.

5. Apparatus according to claim 4 characterized in that said air-fluent insecticidal material-products of combustion discharge open end is truncated conical in shape and the mouth thereof is less in size than the size of said air entry open end, whereby air within said wind tunnel is directed toward the axial center of the last-named mouth.

6. Apparatus according to claim 5 characterized in that said discharge end portion of said exhaust manifold extends toward said axial center.

7. Apparatus for dispensing and distributing fluent insecticidal material including a support; an air-coolable internal combustion engine mounted thereon and having a housing, a drive shaft extending from said housing, and an exhaust manifold extending from said housing and provided with a discharge mouth facing away from said drive shaft; conveying means carried by said support for conveying fluent insecticidal material to and into said exhaust manifold to mix with and be heated by the products of combustion therein and be discharged from said mouth; a wind tunnel housing surrounding said engine and manifold spaced therefrom and having an air entry open end and an air-fluent insecticidal material-products of combustion discharge open end adjacent said mouth; means carried by said support to cool said engine and to cause said fluent insecticidal material and products of combustion discharged from said mouths to form a fog; and a fuel tank, for said internal combustion engine, mounted upon the upper portion of said wind tunnel.

8. Apparatus for dispensing and distributing fluent insecticidal material including a support; an air-coolable internal combustion engine carried thereby and having an engine housing, a drive shaft, and two elongate exhaust manifolds extending from opposite sides of said engine housing in double elbows and thence to the opposite side of said engine housing from the side they opened into said engine housing and thence along said opposite side rearwardly to a location rearwardly of the rear end of said engine housing, and each having rearward end portion extending toward the longitudinal axis of said engine housing and a discharge mouth at the end of said rearward end portion, whereby the paths through said exhaust manifolds are tortuous paths; conveying means carried by said support for conveying fluent insecticidal material to and into said exhaust manifolds to mix with and be heated by the products of combustion therein and be discharged from said mouths; and means carried by said support to cool said engine housing and to cause said fluent insecticidal material and products of combustion discharged from said mouths to form a fog, comprising a fan mounted upon said drive shaft at a location remote from said mouths to direct air upon, around and over said engine housing and about the discharge end portions of said exhaust manifolds at said mouths, and outwardly beyond said mouths.

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