Jan. 15, 1946. H. A. ROSELUND 2,392,883

FOG GENERATOR

Filed Dec. 27, 1943 3 Sheets-Sheet 1

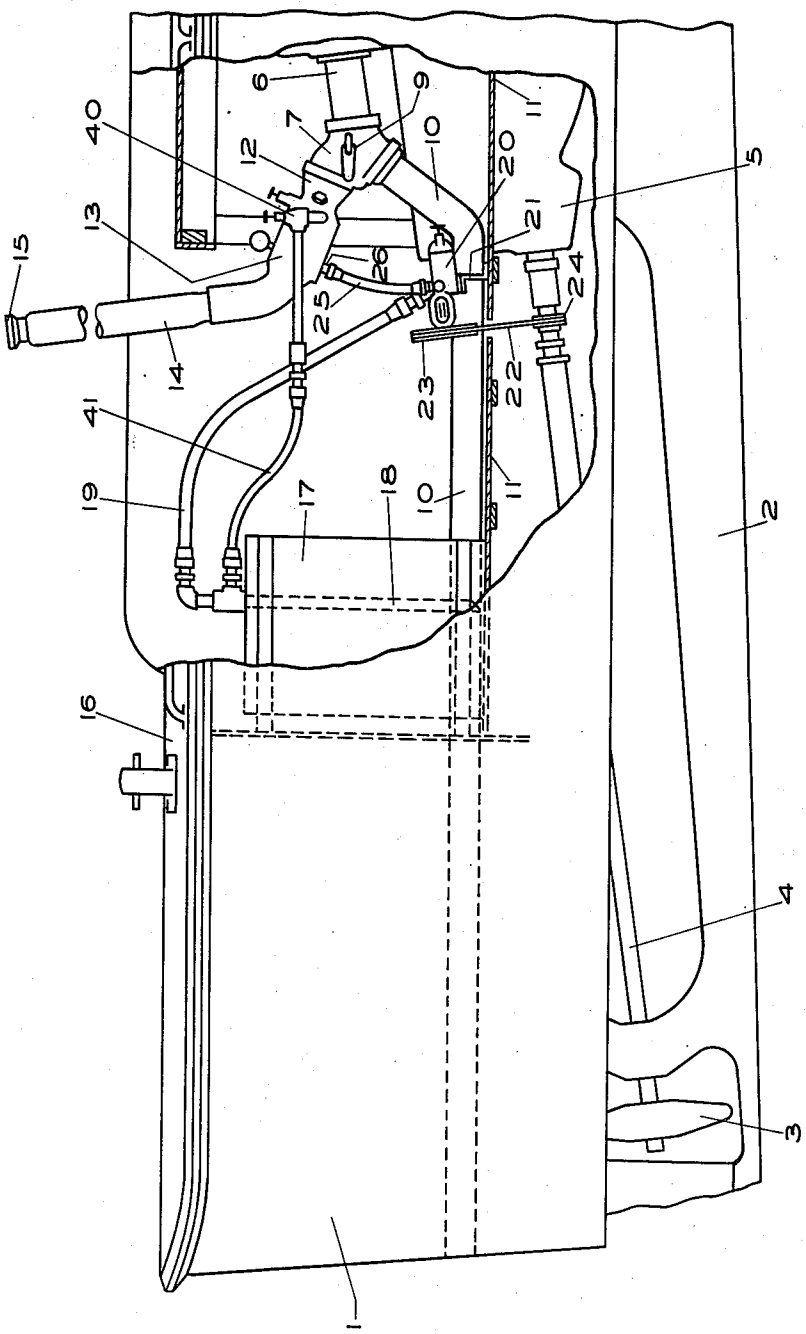

FIG. 1

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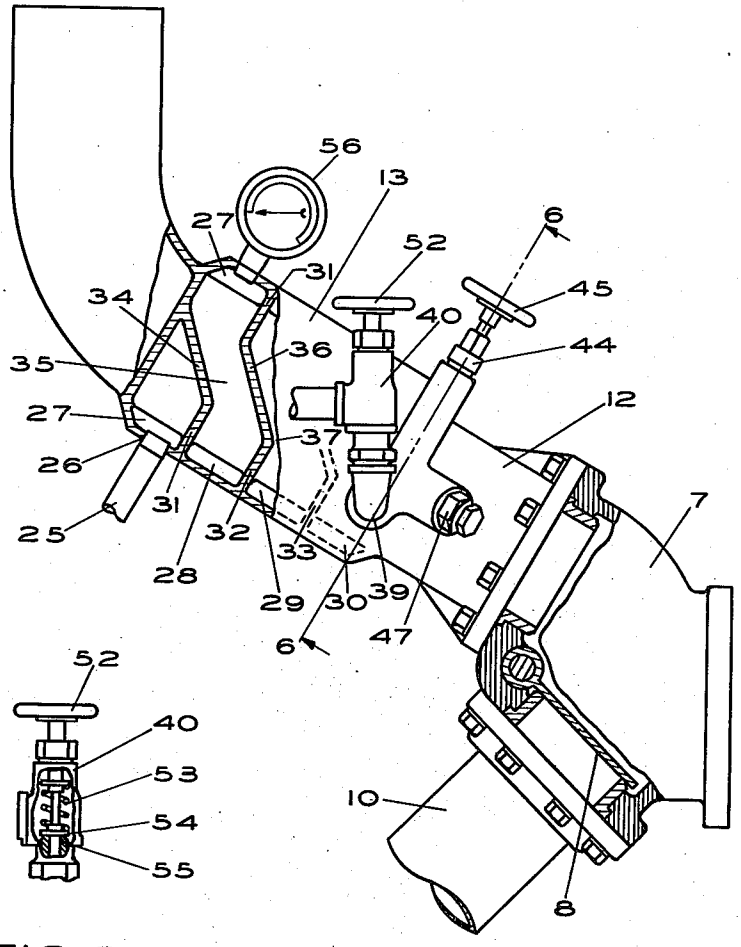

FIG. 2

FIG. 3

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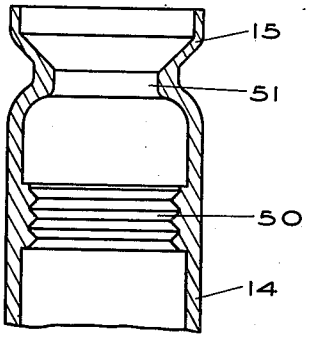

FIG. 4

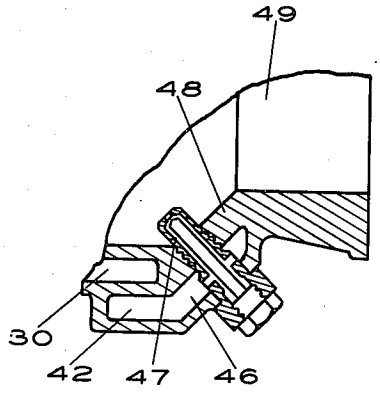

FIG. 5

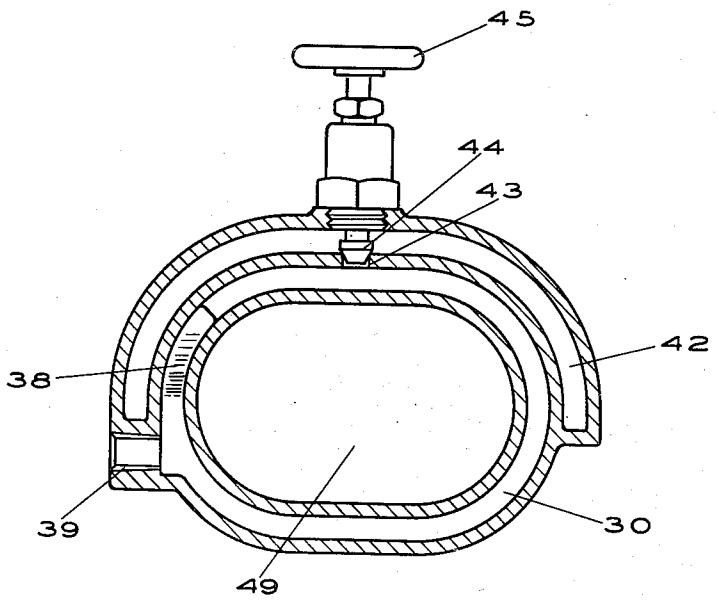

FIG. 6

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UNITED STATES PATENT OFFICE

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FOG GENERATOR

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Application December 27, 1943, Serial No. 515,849

8 Claims. (Cl. 252—359)

This invention relates to an apparatus for generating an artificial fog for use primarily as a camouflaging screen and particularly to such apparatus mounted upon an engine driven boat, air or land craft and associated with the engine of such vehicle in its operation.

An object of the invention is to provide a fog generating apparatus which uses the driving engine of the vehicle on which it is mounted, for actuation.

Another object of the invention is the provision of such an apparatus which may be easily and quickly put into operation.

Still another object of the invention is the provision of such an apparatus which is simple and sturdy in design.

Other objects and advantages of the invention will be apparent upon a reading of the following description with reference to the drawings in which:

Figure 1 is a rather diagrammatical view of the stern of a landing boat with parts broken away to show the fog generator apparatus mounted therein and a portion of the engine of the boat;

Figure 2 is an enlarged elevation with parts broken away of the Y connection fastened to the engine exhaust and the upwardly extending exhaust line with the surrounding oil manifold;

Figure 3 is an elevation with parts broken away of the control valve for the oil return;

Figure 4 is a vertical section through the upper end of the discharge tube;

Figure 5 is a horizontal section through a portion of the manifold and an oil discharge nozzle; and

Figure 6 is a section through the oil manifold on the line 6—6 of Figure 2.

The fog generator uses the inert exhaust gases from the engine to provide heat for volatilizing the oil (preferably a petroleum oil vaporizing around 600° F.), and for carrying the vapor thus formed into the atmosphere where it is precipitated into a fog of oil particles.

The regular exhaust pipe is replaced with two lines branching from a Y connection fastened to the exhaust outlet of the engine. The lower branch constitutes an exhaust outlet when the fog generator is not in use. A hand manipulated valve in the Y connection shuts off this branch when it is desired to create a fog and the exhaust gases are then directed through the other branch with which are associated means for preheating the oil and introducing it in spray form into the flow of exhaust gases and with the gases into the atmosphere.

As shown in Figure 1, the boat 1 on which the generator is mounted, has a keel 2, propeller 3 and propeller shaft 4. The latter is driven by an engine 5. The exhaust pipe 6 of the engine is connected to the Y member 7. A flat damper type valve 8 (see Figure 2) mounted within the member 7 is controlled exteriorly by handle lever 9 to selectively close the opening from the member to either the upper or lower discharge branches. The lower branch 10 extends downwardly toward the deck 11 and then runs aft. The upper branch 12 has a manifold section 13 beyond which it has an upright portion 14 with an outlet 15 extending well above the level of the top deck 16.

An oil supply tank 17 is supported upon the deck 11 somewhat aft of the engine. Oil is drawn from the tank through outlet tube 18 and hose 19 by oil pump 20 which is supported upon the deck 11 by bracket 21. The pump is driven through belt 22 upon pulleys 23 and 24 by the drive shaft of the engine 5. From the pump the oil is delivered through hose 25 and port 26 into manifold 13.

As partially disclosed through the broken away section of Figure 2, the manifold has a series of annular passages 27, 28, 29, and 30 separated by parallel partitions 31, 32 and 33. The partition 31 has a section 34 which turns to the left as viewed in Figure 2 and closes off one end of the passage 27, but leaves an opening 35 into passage 28 from the other end of passage 27.

It may be seen therefore that oil entering the manifold through port 26 will flow under and around the exhaust line 12 through passage 27 and then through opening 35 into passage 28. The partition 32 has a section 36 crossing passage 28 and closing off one end thereof. An opening 37 in the partition 32 provides the outlet for the oil from passage 28 into passage 29. A similar opening 38 in partition 33, indicated in Figure 6, provides the outlet from passage 29 into the end annular passage 30. There are two outlets from 30 one through port 39, pressure regulating valve 40 and hose 41 to container 17. This takes care of any excess oil supplied by the pump. As this oil is heated its return to the container preheats the remaining oil. The other outlet from the passage 30 is into arcuate chamber 42, through port 43 controlled by the shut off valve 44. This has an exterior handle 45.

Extending laterally from each lower end of chamber 42 at each side of the manifold, as shown in Figure 5, is an inwardly inclined passage 46 from which an oil discharge spray nozzle 47 extends through the wall 48 into the exhaust passage 49.

Because of the heat absorbed by the oil during its travel through the manifold, the oil particles discharged from the spray nozzles 47 into the exhaust passage 49 are quickly volatilized.

As the exhaust gases carry the oil vapor upwardly through the stack 14 there is a slight cooling action through the pipe walls and there is inclined to form on the wall surfaces a condensation of small oil particles. Unless these are thrown back into the heated core of the exhaust stream, they are likely to be discharged into the atmosphere as drops too heavy to be long sustained in the air and will drop ineffectively to the ground. To prevent this, a restricted rib section 50 and a restriction 51 are placed in the exhaust pipe 14 near its discharge end 15. The restrictions increase the velocity of the stream while the ribs cause turbulence and also afford a surface to which the oil particles find it hard to cling. Accordingly when the particles reach the ridges of the ribs they are torn from the surface and in the small chamber before the restriction 51 are whirled toward the center of the stream where they are revolatilized.

Before the fog screen is to be produced, the exhaust gases should be directed into the upper flue 49 and through stack 14 by swinging the handle 9 downwardly seating valve 8 against the opening into the lower exhaust pipe 10.

Then the pump 20 should be put into operation by placing the belt 22 over the pulleys 23 and 24. This starts the flow of oil from the container 17 through hose 19 to the pump, and from the pump through hose 25 to the manifold 13.

By turning the valve handle 52 the tension of the spring 53, holding the valve disc 54 to its seat 55, may be varied according to the pressure desired for the oil. The pressure of the oil within the manifold is shown on gauge 56. When, due to the oil delivered by the pump 20, the pressure rises to a point where it overcomes the tension of spring 53, the valve disc 54 is pushed upwardly and sufficient oil passes through the valve and hose 41 back to the container 17 to prevent any further build up of pressure.

Valve 44 is not spring loaded like valve 40. Instead its opening is definitely fixed by turning of the handle 45, irrespective of the oil pressure. This valve is left in closed position until it is desired to start the fog screen.

The flow of hot exhaust gases through the flue 49 will quickly heat the manifold and the oil circulating through it. This preheating puts the oil in better condition to be sprayed into the flue. Opening the valve 44 permits the oil to pass into chamber 42 and to the lateral passages 46 from which the spray nozzles 47 discharge the oil into the flue 49. These nozzles are the pressure type whereby the liquid forced therefrom is discharged in the form of a spray due to the small orifice and the inner nozzle construction. To increase the amount of oil going through the spray nozzle the return of oil to the container 17 is reduced by increasing the pressure required for opening return valve 40. This is accomplished by further tensioning valve spring 53 through handle 52.

When it is desired to discontinue the generation of the fog screen, valve 44 is closed and damper valve 8 is swung upwardly to close off exhaust branch 12 and so direct the exhaust into the lower branch 10. The belt 22 may then be disengaged from the pulleys 23 and 24 to stop the pump 20. It is preferable however to permit it to operate for a short time until the temperature of the manifold 13 is reduced.

While a preferred embodiment of the invention has been shown and described herein, it should be understood that modification may be made therein without departing from the spirit of the invention.

Having thus described my invention, what I claim is:

1. In a fog generating apparatus designed for operation upon a vehicle in association with the internal combustion engine furnishing motive power for the vehicle, a double outlet coupling fastened to the engine exhaust, an exhaust flue connected to each of the two outlets of the coupling, means for introducing a fog producing material into one of the exhaust flues and valve means for directing the flow of engine exhaust into that flue while closing off the entrance into the other flue.

2. In a fog generating apparatus designed for operation upon a vehicle in association with the internal combustion engine furnishing motive power for the vehicle, a double outlet coupling fastened to the engine exhaust, a vertical stack connected to one outlet of the coupling, a horizontal conduit connected to the other outlet, means for introducing a fog forming material into the vertical stack and valve means for closing off the horizontal conduit and directing the flow of engine exhaust into the vertical stack.

3. In a fog generating apparatus according to claim 1, a manifold turning spirally around the fog generating flue in heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing the material from the container and forcing it to the manifold, and connecting means from the container to the pump, from the pump to the manifold, and from the manifold to the discharge means.

4. In a fog generating apparatus according to claim 1, a manifold winding around the fog generating flue in heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing the material from the container and forcing it to the manifold, connecting means from the container to the pump, from the pump to the manifold, and from the manifold to the discharge means, and a return passage for by-passing a portion of the fog material reaching the manifold back from the manifold to the main supply container.

5. In a fog generating apparatus according to claim 1, a manifold turning about the fog generating flue in close heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing the material from the container and forcing it to the manifold, connecting means from the container to the pump, from the pump to the manifold and from the manifold to the discharge means, a return passage for part of the fog material reaching the manifold extending from the manifold back to the main supply container, and regulating means in the return passage for governing the amount of fog material circulating back to the main supply container.

6. In a fog generating apparatus according to claim 1, a manifold turning about the fog generating flue in close heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing

the material from the container and forcing it to the manifold, connecting means from the container to the pump, from the pump to the manifold and from the manifold to the discharge means, a return passage for part of the fog material reaching the manifold extending from the manifold back to the main supply container, regulating means in the return passage for governing the amount of fog material circulating back to the main supply container, and valve means in the connecting means from the manifold to the discharge means to control the discharge.

7. In a fog generating apparatus according to claim 1, a manifold turning about the fog generating flue in heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing the material from the container and forcing it to the manifold, connecting means from the container to the pump, from the pump to the manifold, and from the manifold to the discharge means, a discharge outlet at the end of the flue, and a restrictive portion formed of inwardly extending annular fins within the flue near its outlet end.

8. In a fog generating apparatus designed for operation upon a vehicle in association with the internal combustion engine furnishing motive power for the vehicle, a double outlet exhaust coupling fastened to the engine, an exhaust flue connected to each of the two outlets of the coupling, means for discharging a fog producing material into one of the exhaust flues, valve means for directing the flow of engine exhaust into that flue while closing off the entrance into the other flue, a manifold turning about the first flue in heat absorbing relation thereto for preheating the fog material prior to its discharge into the flue, a main supply container for the fog material, a pump for drawing the material from the container and forcing it to the manifold, connecting means from the container to the pump, from the pump to the manifold, and from the manifold to the discharge means, a return passage for the fog material reaching the manifold extending from the manifold back to the main supply container, regulating means in the return passage for governing the amount of fog material circulating back to the main supply container, valve means in the connecting means from the manifold to the discharge means to control the rate of discharge, and inwardly extending annular fins within the first flue near its outlet to catch and break-up any unvolatilized particles of fog material.

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