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H. S. VAUGHN
MARINE ENGINE MUFFLER
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3,111,190

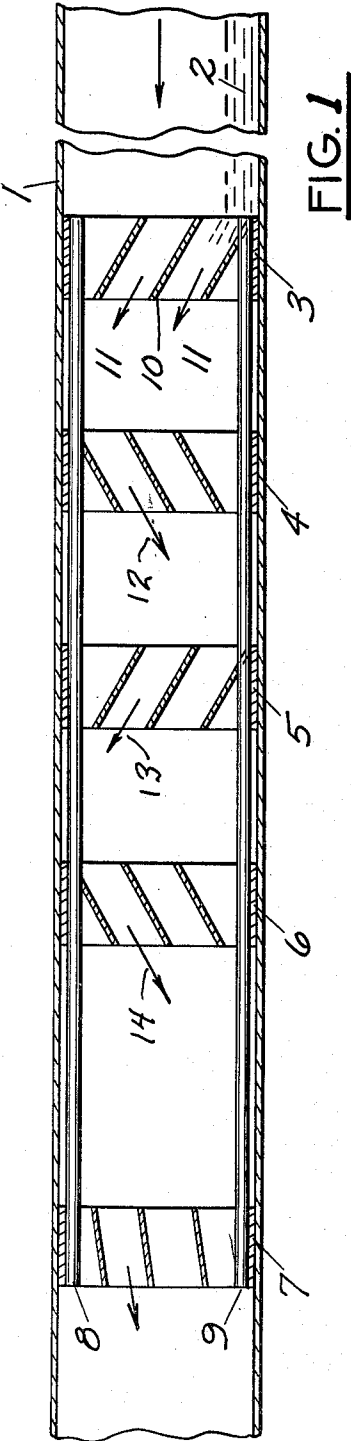
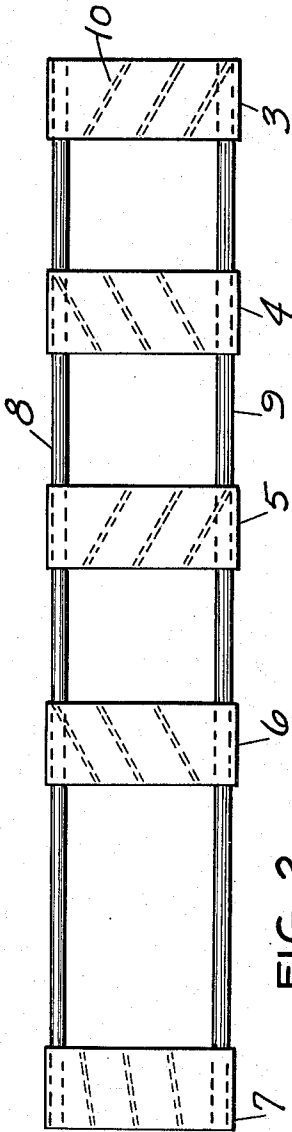


FIG. 2

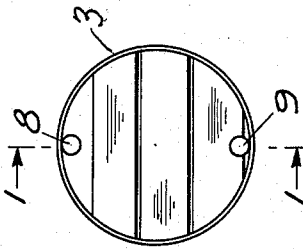


FIG. 3

INVENTOR.
Hubert S. Vaughn
BY Ralph Hammer
Attorney

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MARINE ENGINE MUFFLER
Hubert S. Vaughn, 1042 N. Center St., Corry, Pa.
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In marine engines, the engine cooling water and the exhaust gases are conducted to the stern of the boat through an exhaust pipe. The discharge is above the surface of the water and the noise is substantial. This invention is a muffler which may be inserted in the exhaust pipe to reduce the noise without objectionable increase in back pressure.

In the accompanying drawing, FIG. 1 is a longitudinal section on line 1-1 of FIG. 3 through an exhaust pipe equipped with a muffler, FIG. 2 is a side view of the muffler unit, and FIG. 3 is an end view of the muffler unit.

The exhaust pipe 1 carries both the engine cooling water and the exhaust gases from the engine to the stern of the boat where it discharges above the surface of the water. In the conventional exhaust pipe, the cooling water flows along the lower part of the exhaust pipe as indicated at 2.

In order to reduce the noise level, there is inserted in the exhaust pipe a muffler section of the same diameter as the pipe. This is advantageous when a muffler is to be installed in an old boat. For new boats, the muffler could be made as a separate section to be connected at a convenient point between the inlet and outlet ends of the exhaust pipe.

The muffler comprises of plurality of axially spaced bands or rings 3, 4, 5, 6, 7 suitably connected to upper and lower longitudinally extending rods 8, 9. This provides an assembly which can be assembled into an exhaust pipe, for example by inserting it into the outlet or discharge end of the pipe.

Each of the rings carries a plurality of vertically spaced vanes 10. In the rings 3 and 5, the vanes 10 are inclined upwardly while in bands 4, 6 and 7, the vanes are inclined downwardly. At the entrance to the muffler section, the vanes 10 in the ring 3 deflect the cooling water and exhaust gas upwardly as indicated by arrows 11. The upwardly deflected mixture passing through the band 3 is alternately deflected downward as indicated by arrow 12, upward as indicated by arrow 13, and again downward as indicated by arrow 14 as it passes through the rings 4, 5 and 6.

In rings 3 and 5, the lowermost vane 10 is close to the lower surface and in rings 4 and 6 the uppermost vane 10 is close to the upper surface of the pipe so substantially all of the mixture is subjected to the deflecting and mixing action of the vanes. The vanes deflect the water and exhaust gases transversely to the general direction of flow, first in one direction and then in the opposite direction, and the resultant effect is to mix the water and exhaust gases so that upon passing through the ring 6, the mixture is almost like a fog. At this point, the

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exhaust gas noises of the motor are reduced to such an extent that other engine noises (i.e. valve tappets, etc.) become noticeable.

The exhaust gases could be discharged directly to the atmosphere after passing through the ring 6 but the fog-like discharge is sometimes objectionable. The fog is decreased to a tolerable amount by passing the fog through the ring 7 where the vanes 10 are downwardly inclined. This last stage does not have any quieting effect but it does cause the heavier particles of the fog to combine into drops so as to eliminate the objectionable fog effect.

Part of the reduction in noise is due to the intimate mixing of the exhaust gases and cooling water which both cools the exhaust gases and attenuates the noise. This is accomplished in a very short section of the same diameter as the exhaust pipe. The length of the quieting section of the muffler (rings 3 to 6 inclusive) can be as little as five times the diameter of the exhaust pipe.

As with all mufflers, there is some increase in engine back pressure, but the effect is negligible, possibly due to the cooling of the exhaust gases by the engine cooling water and the consequent reduction in volume.

What is claimed as new is:

1. For use with a marine engine having a horizontal exhaust pipe carrying the engine cooling water and exhaust gases, said pipe having a series of uniplanar vanes within the same and spaced axially from each other along the pipe, alternate of the vanes in the series extending upwardly and outwardly to deflect the cooling water and exhaust gases upwardly and outwardly and the other of the vanes in the series extending downwardly and outwardly to deflect the cooling water and exhaust gases downwardly and outwardly.

2. The structure of claim 1 in which the outlet of the exhaust pipe is above water and additional vanes are provided in the section of pipe prior to the outlet to deflect the exhaust gases and cooling water downward.

3. The structure of claim 1 in which the vanes are carried in a plurality of axially spaced rings fitting inside the exhaust pipe and members extend axially between the rings and connect the rings into an assembly which may be inserted into the pipe.

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