

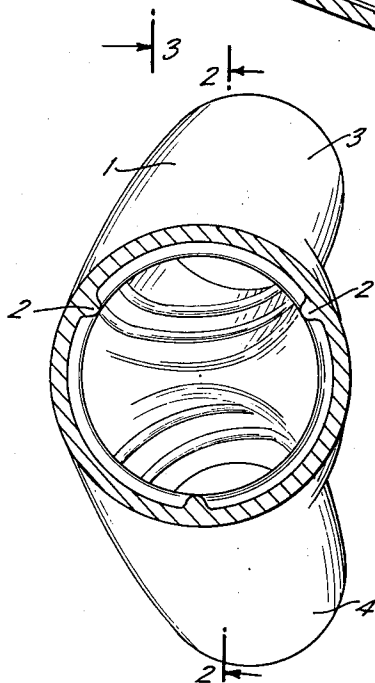
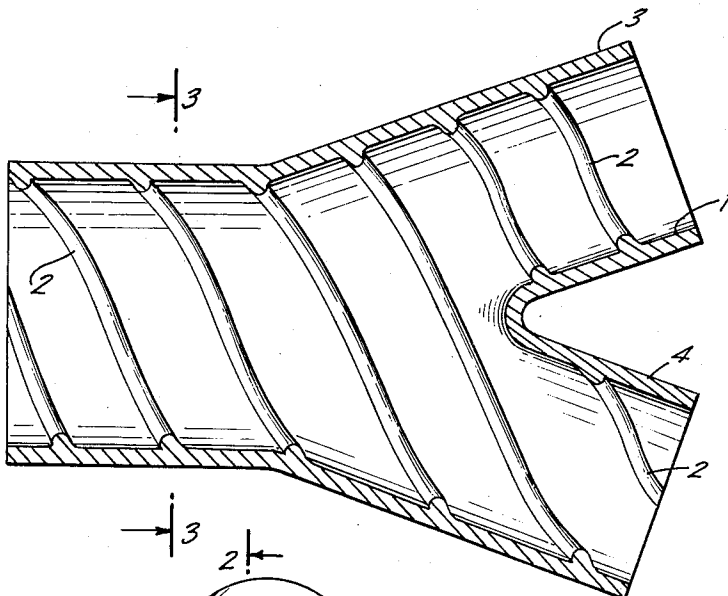
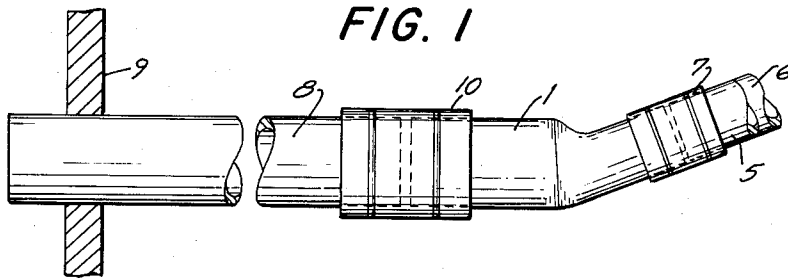
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J. E. GERLI

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MUFFLER

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INVENTOR.  
JOHN E. GERLI

BY

Harvey W. Edallblate  
ATTORNEY

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3,047,091  
MUFFLER

John E. Gerli, Taconic Road, Greenwich, Conn.  
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This invention relates to an exhaust coupling device for internal combustion engines having a plurality of exhaust manifolds. More particularly, the invention relates to a water cooled and muffled exhaust connection for marine engines which have two or more exhaust manifolds.

When operating the conventional marine engine cooling water is pumped through the engine block, then through the water jacket of the exhaust manifold, after which it is mingled with the exhaust gases, passed through a muffler and discharged at the transom of the boat. When the engine is of the V type and has two or more exhaust manifolds, the means for disposing of the exhaust gases and cooling water become complicated and expensive. There must either be two separate exhaust lines with mufflers, or the exhaust manifolds must be joined with conventional pipe fittings. Both installations are expensive and take up an unduly large amount of space.

The present invention provides a relatively inexpensive and very simple means of bringing the exhaust gases and spent cooling water from two manifolds together from where they may be discharged through a single opening in the transom or hull of the boat. Because of the unique construction of the device of the present invention, the water passing through is caused to swirl and build up on the inner walls where it insulates the surface from contact with hot gases and, more importantly, has a sound-absorbing effect which muffles the exhaust noises. Because the device of the present invention is so surprisingly effective in deadening exhaust noises, the conventional mufflers may be eliminated. This, of course, reduces costs and simplifies the construction. The device of the present invention may, therefore, be called a water cooled and muffled exhaust manifold and muffler for multi-manifolded marine engines.

In order that the nature of the invention may be more easily understood, reference is made to the accompanying drawing in which:

FIGURE 1 is an elevational view, with parts cut away, showing how the new muffler of the invention is installed in a boat;

FIGURE 2 is a cross-section of the muffler enlarged over FIGURE 1 taken along line 2—2 of FIGURE 3, looking in the direction of the arrows; and

FIGURE 3 is a cross-section of the muffler enlarged over FIGURE 1 looking down its principal axis from a position represented by lines 3—3 of FIGURE 2.

Referring again to FIGURE 2, it will be seen that the inner periphery of the muffler 1 is provided with helical ribs 2 which may be an integral part of the cast body. Ordinarily, the muffler is cast in one piece from bronze, aluminum, iron or other suitable material. The helical ribs need not stand out very far from the inner surface, about one-eighth of an inch in the smaller mufflers is adequate. In the larger mufflers the ribs may be more pronounced and may stand out as much as one inch from the inner surface of the casting. The pitch, or lead, of the helical ribs may vary from about fifteen degrees taken from a line parallel to the axis to about sixty

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degrees. For engines with two exhaust manifolds branches 3 and 4 from the main body of the muffler are provided. These branches are also provided with ribs having the same twist as in the main body of the muffler as shown in the drawing.

Each of the branches is connected to one of the engine manifolds (not shown) by suitable pipes 5 and 6 as shown in FIGURE 1. A flexible sleeve 7 of suitable heat resisting material connects each of the branches 3 and 4 to exhaust manifold pipes as shown. Also, as shown in FIGURE 1, the larger end of the muffler may be connected to an exhaust pipe 8 which passes through the transom 9 or the hull of the boat. A suitable coupling means 10 connects the muffler to the exhaust pipe as shown.

When installed and in operation hot exhaust gases intermingled with warm cooling water enter the branches of the muffler from each of pipes 5 and 6. On striking the helical ribs the fluids are deflected and caused to swirl in a helical pattern to conform to the pitch of the ribs. Centrifugal force of the rotating water tends to force it to the inner surface of the muffler, and a substantial layer of water is formed which has a definite sound-absorbing capacity making the operation of the engine much quieter than would otherwise be the case. The layer of water also protects the inner surface of the muffler from contact with hot gases and tends to keep it cooler than it would be without the helical ribs. As will be seen, the new muffler of the present invention is relatively inexpensive to construct and simple to install. It is also effective.

I claim:

1. An exhaust coupling between V-type marine engine exhaust manifolds and their tail pipes comprising a Y portion, said portion having a smooth interior surface with spiral rib means thereon, the pitch of said rib means being substantially the same throughout said Y portion.

2. An exhaust coupling between V-type marine engine exhaust manifolds and their tail pipes comprising a Y portion, said portion having a smooth interior surface with spiral ribs standing out from the interior surface a distance of about  $\frac{1}{8}$  to 1 inch, the pitch of said rib means being substantially the same throughout said Y portion and being between about 15° to 60° from a line parallel to the axis of the circular portions of said exhaust coupling.

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