

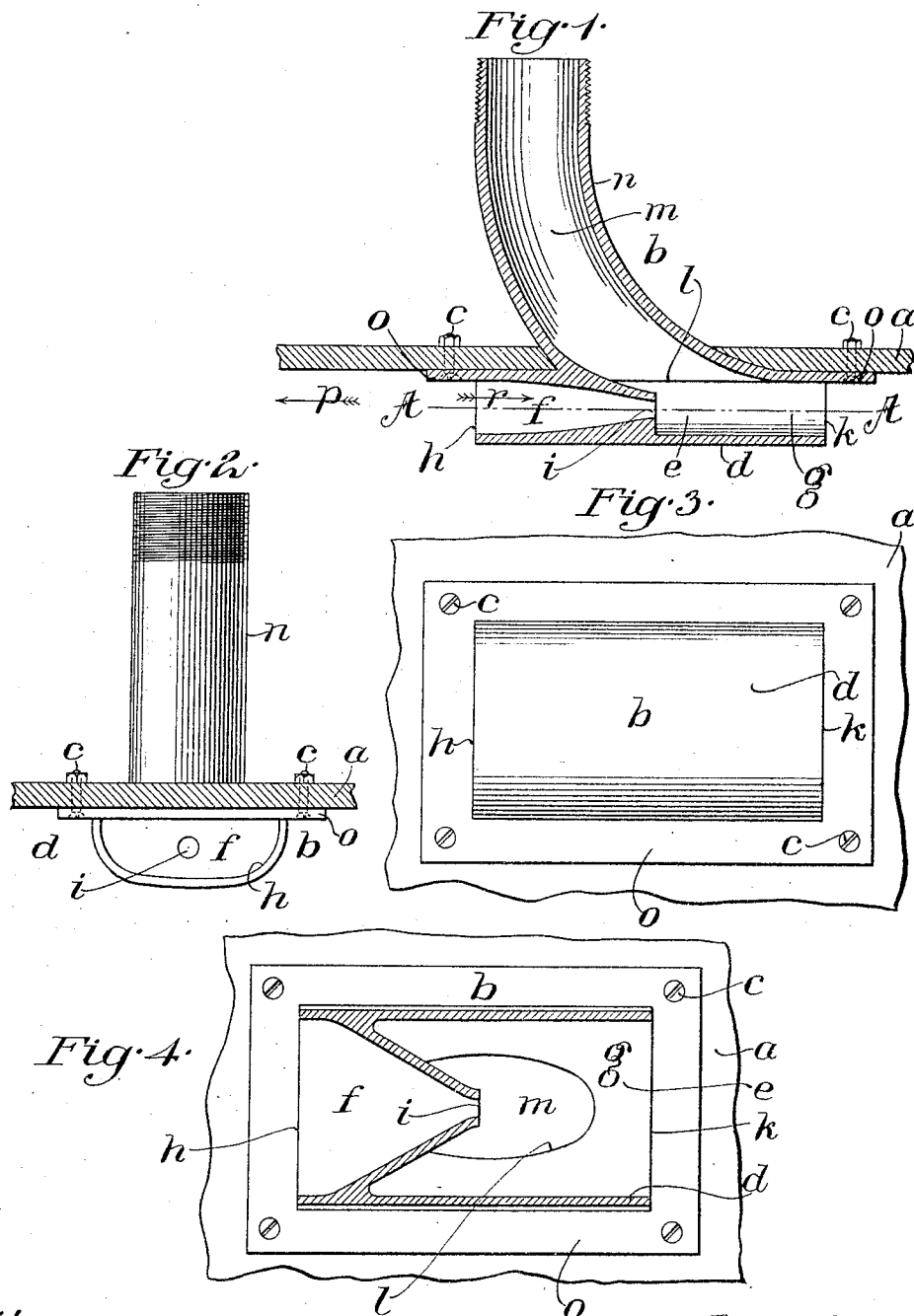
No. 818,951.

PATENTED APR. 24, 1906.

H. N. GOODWIN.

SUBMERGED EXHAUST DEVICE FOR MARINE ENGINES.

APPLICATION FILED DEC. 7, 1905.



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UNITED STATES PATENT OFFICE.

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SUBMERGED EXHAUST DEVICE FOR MARINE ENGINES.

No. 818,951.

Specification of Letters Patent.

Patented April 24, 1966.

Application filed December 7, 1905. Serial No. 290,822.

To all whom it may concern:

Be it known that I, HERBERT N. GOODWIN, a citizen of the United States, residing at Newburyport, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Submerged Exhaust Devices for Marine Engines, of which the following is a specification.

The ordinary exhaust-pipe at present in common use for marine gasoline-engines extends from the cylinder along the side of the vessel to a point near the stern, discharging the products of combustion above the water, and thereby creating much noise, as well as a very disagreeable odor. To overcome these objections and to obtain a practical underwater exhaust-nozzle in which back pressure and noise are entirely avoided and which is simple, inexpensive, and can be readily attached to the bottom of a vessel is the object of my invention.

The invention consists in an exhaust-nozzle adapted to be fastened to the bottom of a boat and comprising in its construction a casing with a passage extending longitudinally therethrough, said passage consisting of an inlet-chamber and an outlet-chamber, said inlet-chamber having an inlet and an outlet orifice, said outlet-orifice being of substantially smaller area than said inlet-orifice and opening into said outlet-chamber, said outlet-chamber provided with an outlet-orifice and with an intermediate orifice opening thereinto adjacent to said inlet-chamber outlet-orifice, said intermediate orifice adapted to be connected to the exhaust of an engine.

The invention further consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

It will be understood that in the device of my invention the longitudinal passage is open to the water at both ends, so that the water entering at the front end of said longitudinal passage is caused, by the forward movement of the vessel, to rush through said passage with great force and passing through said contracted portion forms a partial vacuum in the second passage, which assists the exhaust of the engine by suction in said exhaust-pipe, and the water passing through said longitudinal passage with great force carries with it into the sea the products of combustion which pass down the exhaust-pipe or second

passage into said longitudinal passage. The pressure of the gas at the discharge-outlet is thus reduced to a minimum and the noise of the exhaust eliminated.

Referring to the drawings, Figure 1 is a sectional elevation of my exhaust-nozzle, the same being shown attached to a portion of the bottom of a boat. Fig. 2 is a front elevation of my improved nozzle, showing the same attached to a portion of the bottom of a boat. Fig. 3 is an underneath plan of the same. Fig. 4 is a horizontal section, partly in elevation, taken on line A A of Fig. 1.

Like letters of reference refer to like parts throughout the several views of the drawings.

In the drawings, *a* represents a portion of the bottom of a boat or vessel to which is attached my improved exhaust-nozzle *b* by means of bolts *c c*. Said exhaust-nozzle consists of a casing *d*, having a longitudinal passage *e* extending horizontally therethrough and consisting of an inlet-chamber *f* and an outlet-chamber *g*. Said inlet-chamber is provided with an inlet-orifice *h* and an outlet-orifice *i*, said outlet-orifice being of substantially smaller area than said inlet-orifice and opening into said outlet-chamber *g*. The outlet-chamber *g* is also provided with an outlet-orifice *k* and with an intermediate orifice *l*, which opens into said outlet-orifice adjacent to the orifice *i*, said intermediate orifice constituting an outlet-orifice of a second passage *m*, extending through the upwardly and forwardly extending curved portion *n* of the casing *d*. The upper end of the curved portion *n* is screw-threaded in order to adapt the same to be readily connected with the exhaust-pipe of an engine located in the vessel or boat *a*.

It will be understood that the inlet-orifice *h* opens toward the front of the vessel, while the outlet-orifice *k* opens toward the stern of the vessel.

A flange *o* extends around the casing *d*, through which the bolts *c* extend and by which said casing is clamped or fastened to the bottom of the vessel.

It will be noted that the inlet-chamber *f* is conical or funnel-shaped, the walls thereof converging toward each other from the inlet-orifice *h* to the outlet-orifice *i* thereof, thus forming in the longitudinal passage *e* a contracted portion between the inlet-orifice *h* and the outlet-orifice *k* thereof, while the sec-

ond passage *m* opens into the outlet-chamber *g* or into the longitudinal passage *e* adjacent to the outlet-orifice *i* and between the inlet-orifice *h* and outlet-orifice *k* of said longitudinal passage. With the exception of this contracted portion, therefore, the water has an unobstructed passage from the front of the longitudinal passage *e* to the rear or outlet orifice *k* of said passage, and as the vessel moves forwardly in the direction of the arrow *p* a powerful rush of water through said passage from the front to the rear thereof is obtained, which causes the vacuum hereinbefore referred to at the outlet *l* of the second passage *m* and carries with it the products of combustion passing down the vertical curved pipe *n*, cooling the same and at the same time reducing the pressure of gas at the outlet-orifice to a minimum, thereby avoiding back pressure in the engine, as well as noise and the disagreeable odor produced where the products of combustion are discharged above the surface of the water. The tunnel shape of the inlet-chamber *f* also tends to increase the force of the stream or current of water as it passes the lower end of the curved portion *n* or of the outlet-orifice *l* of the second passage *m*, and thus this conical construction of the inlet-chamber increases the vacuum and the downward suction through the second passage *m*.

The waste water from the jacket surrounding the engine-cylinder may be advantageously led into and discharged through the exhaust-pipe *n*, as it will serve to contract the volume of escaping gases and still further reduce the pressure at the discharge-outlet. By extending the exhaust-pipe directly down from the engine through the bottom of the vessel instead of along the side of the same the objectionable heat hitherto radiated from the said outwardly-exposed exhaust-pipe is entirely avoided.

The operation of my improved device is as follows: Assuming the boat to be moving forward or in the direction of the arrow *p*, the water will pass into the inlet-chamber *f* in the direction of the arrow *r*. The water passes through the inlet-chamber *f* and through the contracted outlet-orifice *i* into the outlet-chamber *g*, causing at this point in the outlet-chamber a vacuum which exerts a suction upon the second passage *m*, which draws the gases and products of combustion from the exhaust of the engine downwardly through the curved pipe or portion *n* into the outlet-chamber *g* and forces the same out of said outlet-chamber through the outlet-orifice *k*.

The vacuum hereinbefore referred to is caused by the difference in temperature between the cold water which enters from the inlet-chamber *f* and the hot gases which pass downwardly through the second passage *m*

and also by the velocity of the water which passes from the inlet-chamber *f* through the contracted outlet-orifice *i* into the outlet-chamber *g*.

Having thus described my invention, what I claim, and desire by Letters Patent to secure, is—

1. An exhaust-nozzle adapted to be fastened to the bottom of a boat comprising in its construction a casing provided with a passage extending longitudinally therethrough, said passage consisting of an inlet-chamber and an outlet-chamber, said inlet-chamber having an inlet and an outlet orifice, said outlet-orifice being of substantially smaller area than said inlet-orifice and opening into said outlet-chamber, said outlet-chamber provided with an outlet-orifice and with an intermediate orifice opening thereinto adjacent to said inlet-chamber outlet-orifice, said intermediate orifice adapted to be connected to the exhaust of an engine.

2. An exhaust-nozzle adapted to be fastened to the bottom of a boat comprising in its construction a casing provided with a passage extending longitudinally therethrough, said passage consisting of an inlet-chamber and an outlet-chamber, said inlet-chamber having an inlet and an outlet orifice, said outlet-orifice being of substantially smaller area than said inlet-orifice and opening into said outlet-chamber, said outlet-chamber provided with an outlet-orifice, said casing provided with a second passage opening into said outlet-chamber adjacent to said inlet-chamber outlet-orifice and adapted to be connected to the exhaust of an engine.

3. In combination, a boat and an exhaust-nozzle fast to the exterior of the bottom of said boat, said nozzle comprising in its construction a casing provided with a passage extending longitudinally therethrough, said passage consisting of an inlet-chamber and an outlet-chamber, said inlet-chamber having an inlet and an outlet orifice, said outlet-orifice of substantially smaller area than said inlet-orifice and opening into said outlet-chamber, said inlet-chamber opening toward the bow of said boat, said outlet-chamber provided with an outlet-orifice, said casing provided with a second passage opening into said outlet-chamber adjacent to said inlet-chamber outlet-orifice, said second passage extending into said boat and adapted to be connected to the exhaust of an engine.

4. An exhaust-nozzle adapted to be fastened to the bottom of a boat comprising in its construction a casing provided with a passage extending longitudinally therethrough, said passage consisting of an inlet-chamber and an outlet-chamber, said inlet-chamber having an inlet and an outlet orifice, said outlet-orifice being of substantially smaller area than said inlet-orifice, said inlet-chamber

converging from said inlet-orifice toward said
outlet-orifice, said inlet-chamber outlet-or-
fice opening into said outlet-chamber, said
outlet-chamber provided with an outlet-or-
fice and with an intermediate orifice opening
5 thereinto adjacent to said inlet-chamber out-
let-orifice, said intermediate orifice adapted
to be connected to the exhaust of an engine.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit- 10
nesses.

HERBERT N. GOODWIN.

Witnesses:

CHARLES S. GOODING,
ANNIE J. DAILEY.