T. T. TVEDT.

MUFFLER.

APPLICATION FILED DEC. 27, 1916.

1,291,271. Patented Jan. 14, 1919.

Fig. 1.

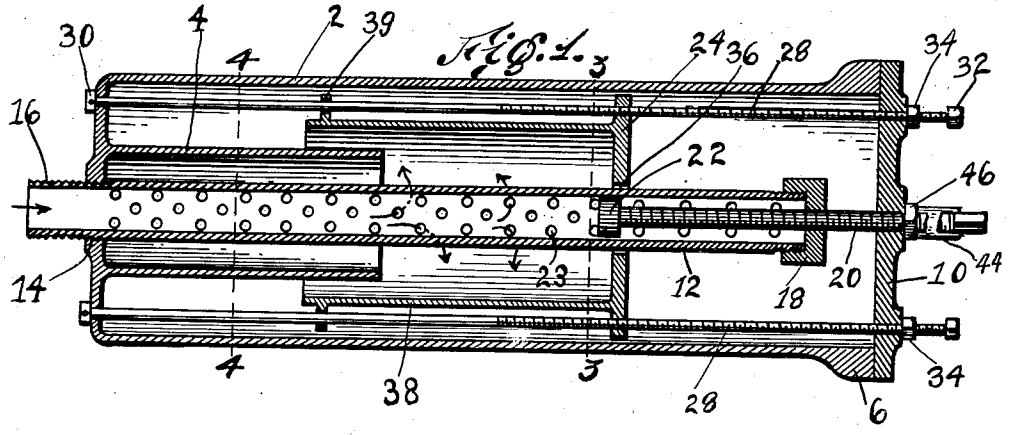


Fig. 5.

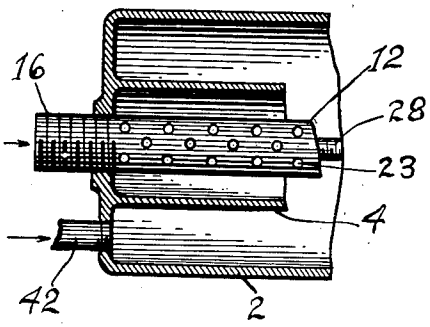


Fig. 6.

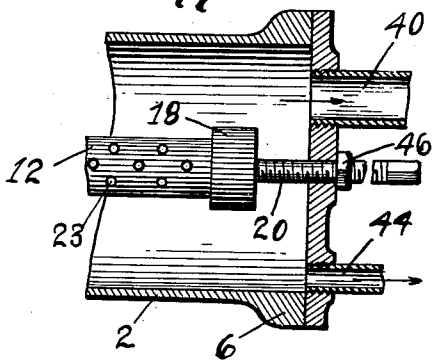


Fig. 4.

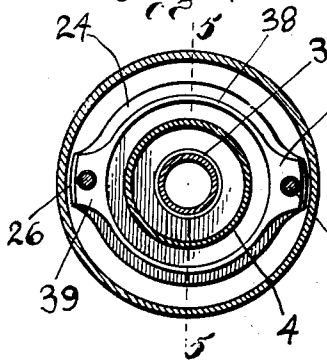


Fig. 3.

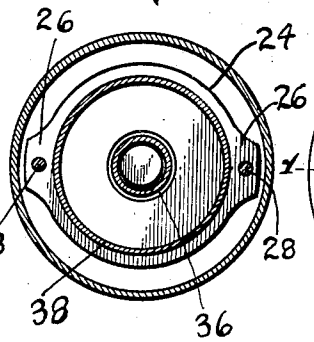
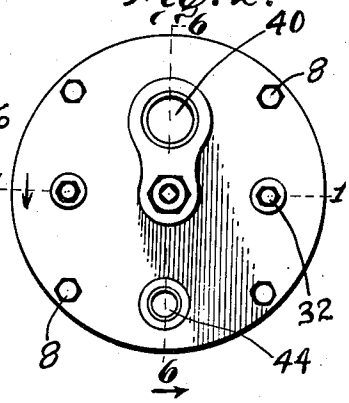


Fig. 2.



Inventor

Thomas T. Tvedt

By his Attorneys

Newell & Real

UNITED STATES PATENT OFFICE.

THOMAS T. TVEDT, OF BROOKLYN, NEW YORK.

MUFFLER.

1,291,271. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed December 27, 1916. Serial No. 139,213.

To all whom it may concern:

Be it known that I, THOMAS T. TVEDT, a citizen of the United States, residing at Brooklyn, New York, have invented certain new and useful Improvements in Mufflers, of which the following is a clear, full, and exact description.

This invention relates to sound muffling or silencing devices, and particularly to mufflers intended for muffling the exhausts from internal combustion engines.

A general object of the invention is to increase the efficiency of mufflers for all of the uses for which they are intended, and particularly to provide a muffler which not only will reduce the noise from the exhaust to a minimum but which will exert also a minimum of back pressure upon the engine.

Another object of the invention is to provide a muffler in which adjustments may be made either to regulate the extent of its muffling effect or to vary the amount of back pressure which it exerts.

The invention aims particularly so to construct a muffler that when it is applied to an engine of the approximate size or type for which it is intended that it may be adjusted to adapt it for variations from the conditions which were taken into consideration in its design.

An important feature of the invention is the arrangement in a muffler of a series of overlapping concentric cylindrical baffles so that these baffles may be moved relatively to vary the relative capacities of the successive expansion chambers or to vary the length of the path of travel of the exhaust gases through the muffler. Another important feature of the invention is the provision of means for discharging a variable proportion of the exhaust gases directly into the last of a series of expansion chambers.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section of a muffler embodying the invention, on the line 1—1 of Fig. 2;

Fig. 2 is a right-hand end view of the muffler;

Fig. 3 is a transverse section on the line 3—3 of Fig. 1;

Fig. 4 is a transverse section on the line 4—4 of Fig. 1;

Fig. 5 is a sectional detail of the left-hand end of the muffler on the line 5—5 of Fig. 4; and

Fig. 6 is a sectional detail of the right-hand end of the muffler on the line 6—6 of Fig. 2.

The illustrated muffler comprises an outer casing 2, which may be formed as a casting having integral therewith the inner cylindrical baffle 4, the casing 2 having an enlargement 6 at its end, into which are tapped the holes for the screws 8 by which the end 10 is attached to the casing.

The exhaust gases from the engine are conducted into the interior of the muffler casing 2 through a tube 12, which is screwed into an inlet opening 14 in the integral end of the casing 2, the tube being threaded a sufficient distance from its end to provide a projecting portion 16 for a union or other coupling, for connection with the engine exhaust. At its other end the tube 12 is provided with a cap 18 having a central opening through which passes a threaded rod 20 threaded through the end 10 of the casing and carrying at its end within the tube a piston or diaphragm 22, which fits loosely within the tube. The tube 12 is provided throughout its length within the casing 2 with discharge openings 23, through which the exhaust gases are discharged into the expansion chambers provided within said casing, these openings being of any suitable shape and number.

A transverse baffle plate 24 serves to divide the casing 2 into two expansion chambers, this plate—as shown in Fig. 3—being somewhat smaller than the transverse dimensions of the inside of the casing 2, and having ears 26 through which are threaded adjusting rods 28 by which the plate 24 may be moved lengthwise of the casing 2, to vary the relative capacities of the two expansion chambers into which it divides said casing. The rods 28 extend through both end walls of the casing 2 and are each provided upon one end with a head 30, and upon the other end with a head 32 and a lock-nut 34. Not only does the transverse baffle plate 24 not extend entirely across the interior of the casing 2 but it also fits loosely about the tube 12, the opening 36 through which the tube 12 passes being, as shown, somewhat larger than the tube, thus permitting the escape of some of the gases through this opening.

A second cylindrical baffle 38 of a diameter somewhat larger than the baffle 4, is arranged concentric to the baffle 4 and is preferably carried by the baffle plate 24 which forms, as shown, an integral end wall of said cylindrical baffle 38. The cylindrical baffles 4 and 38 normally overlap to increase their action, and the extent of this overlapping and also the relative capacities of the expansion chambers within the said baffles may be varied by the movement of the baffle 38 lengthwise of the casing 2 together with the movement of the transverse baffle 24. This movement effects a telescoping of the baffles 4 and 38 and not only varies the capacities of the expansion chambers within said baffles but also varies the length of the path of travel which the gases must follow as they pass from the inlet opening 14 to the exhaust or outlet opening 40, shown in Fig. 6. To guide and support the baffle 38 in its movement of adjustment, it is provided with ears 39 having guide openings which receive the smooth portions of the rods 28. When the muffler is used as a water muffler as, for example, upon a power boat, it is preferably cooled by the passage therethrough of a stream of water which may enter the pipe 42 and pass out of the pipe 44. If it is to be used within a smoke stack, the connection 42 is unnecessary.

Mufflers are usually designed and built for engines of particular types and of particular horse power ratings, or at least for engines within a certain range of horse power ratings, but it is found in practice that two engines of the same ratings may vary considerably in their actual performance. When mufflers of the same design are attached to different engines, it is found that both the muffling effect of the mufflers varies and also their effect upon the engines with respect to back pressure. As hereinabove suggested, a principal object of the invention is to overcome these conditions and to produce a muffler that is adaptable within certain limits to compensate for varying conditions presented by different engines of the same type or rating.

From the foregoing description it will be seen that an adjustment of the baffle plate 24 varies the relative capacities of the successive expansion chambers through which the gases discharged from the tube 12 must pass before they reach the exhaust 40, thus varying at the same time both the muffling effect and the back pressure upon the engine. The discharge of the gases from the tube 12 may also be controlled to some extent by means of the piston or diaphragm 22, which is adjustable lengthwise of said tube by means of the rod 20 and which may be secured in any position of adjustment by means of the lock nut 46. If it is desired to discharge some of the gases directly into the last of the series of expansion chambers, the diaphragm 22 will be moved toward the right of Fig. 1, uncovering some of the openings 23 beyond the baffle plate 24. With the two adjustments just described, substantially any conditions within the normal range of variations to be found in engines of the type for which the muffler is particularly designed may be cared for.

It will be understood that the invention is not restricted to the particular arrangement of baffles, to the particular means for introducing the gases into the expansion chambers nor to the particular means for securing the adjustments.

What I claim as new is:—

1. A muffler comprising an elongated casing having an exhaust opening at one end, a transverse baffle plate in said casing adjustable lengthwise thereof to vary the relative capacities of the expansion chambers into which said plate divides the interior of said casing, and means connected with the end of said casing remote from said exhaust and extending through said baffle plate for conducting the gases to be discharged into said casing, said means having discharge openings along its sides so arranged that a variable proportion of the gases are discharged into the respective chambers, as said baffle plate is adjusted lengthwise of said casing.

2. A muffler comprising an elongated casing having an exhaust opening at one end, a transverse baffle dividing the interior of said casing into a plurality of expansion chambers and adjustable lengthwise of said casing to vary the relative capacities of said chambers, overlapping cylindrical baffles upon the side of said transverse baffle remote from said exhaust opening, one of said cylindrical baffles being connected to said transverse baffle and another being connected to the end wall of said casing, and means for introducing the gases into said casing comprising a perforated tube extending through said transverse baffle and having perforations upon both sides of said baffle, and a diaphragm in said tube adjustable lengthwise thereof.

3. A muffler comprising an elongated casing having an exhaust opening at one end, a transverse baffle dividing the interior of said casing into a plurality of expansion chambers and adjustable lengthwise of said casing to vary the relative capacities of said chambers, overlapping cylindrical baffles upon the sides of said transverse baffle remote from said exhaust opening, one of said cylindrical baffles being connected to said transverse baffle and another being connected to the end wall of said casing, means for introducing the gases into said casing comprising a perforated tube extending through said transverse baffle and having

perforations upon both sides of said baffle, a diaphragm in said tube adjustable lengthwise thereof, and means extending to the exterior of said casing for effecting the adjustment of said transverse baffle and of said diaphragm.

Signed at New York city, N. Y., this 23" day of December, 1916.

THOMAS T. TVEDT.

Witnesses:
BEATRICE MIRVIS,
ABRAM BERNSTEIN.