No. 675,830. Patented June 4, 1901.

E. P. GRAY.

STEAM MUFFLER.

(No Model.) (Application filed Sept. 17, 1900.)

Fig. 1.

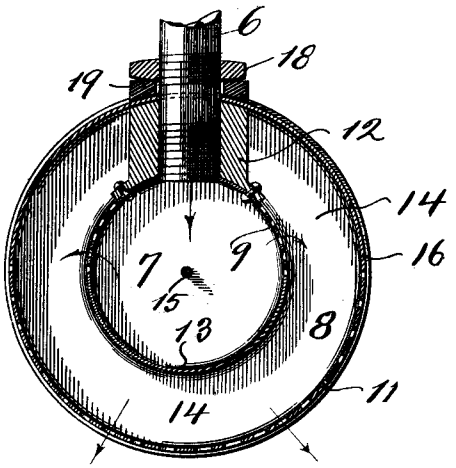


Fig. 2.

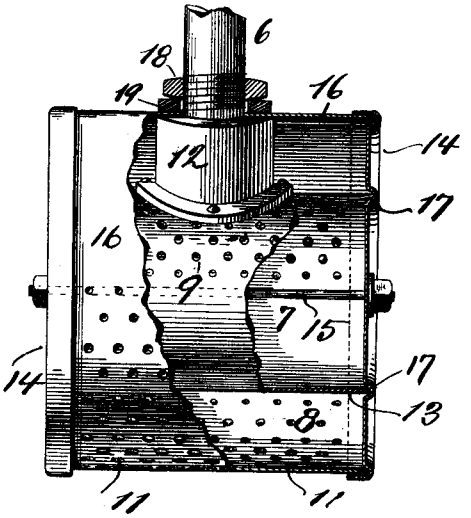


Fig. 3.

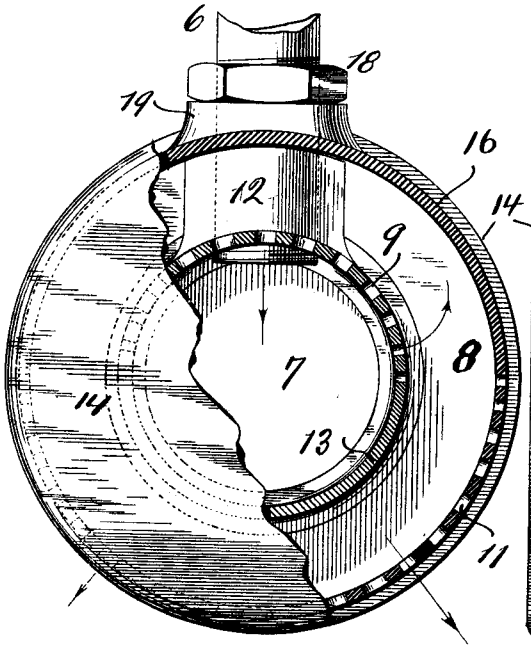
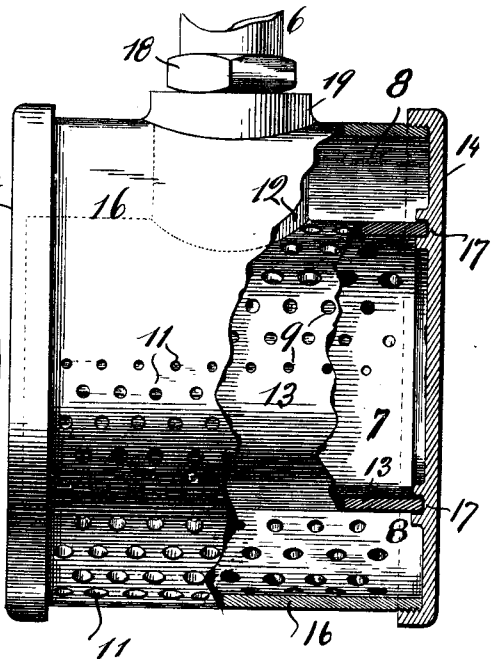


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

EMMET P. GRAY, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO OTTO ARMLEDER, OF SAME PLACE.

STEAM-MUFFLER.

SPECIFICATION forming part of Letters Patent No. 675,830, dated June 4, 1901.

Application filed September 17, 1900. Serial No. 30,219. (No model.)

To all whom it may concern:

Be it known that I, EMMET P. GRAY, a citizen of the United States, and a resident of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Exhaust-Mufflers; and I do hereby declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form also a part of this specification.

This invention relates to improvements in exhaust-mufflers, which are devices designed to operate for the purpose of deadening the puffing sound accompanying the escape from the exhaust-outlet of a motor of the medium—steam, gas, or vapor—used therein and after the same has performed its work. It is more particularly intended for motors using gases and vapors the useful effect from which is obtained by exploding limited and measured quantities of them in continued succession. In such connection the object of these mufflers is to lessen or deaden the sound of these explosions, which sound is especially objectionable in such motors used on public thoroughfares—like, for instance, automobiles using gasolene. In general, most of these devices operate by retarding the escape from the exhaust-pipe, which retardation, however, in most cases is of such an extent as to interfere with the escape, causing back pressure, which in its reaction upon the motor is very objectionable.

The object of my invention is therefore to provide an improved exhaust-muffler which accomplishes the desired result without these objectionable after effects, which at the same time is of sufficient strength to withstand the strain, and which is, further, of simple construction, so as to permit its manufacture at a reasonable cost.

In the following specification, and particularly pointed out in the claims following, is found a full description of the invention, together with its operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical cross-section of my improved exhaust-muffler. Fig. 2 is a side view thereof with parts broken away and shown in longitudinal section. Fig. 3 is an end view of the same with parts broken away, and Fig. 4 is a side view of the preceding figure with parts broken away and shown in longitudinal section.

The device shown by the last two figures is modified as to details of construction as against the device illustrated in the first two figures.

The used steam, exploded vapor, or burned gases, whatever the case may be, escaping from the end of exhaust-pipe 6 enter first into a chamber 7 of comparatively large capacity and sufficiently so to accommodate the first volume of the entering exhaust without causing back pressure and reaction on the motor. This compartment is surrounded by an annular chamber 8, into which the exhaust passes from chamber 7 through openings 9. This annular chamber 8 is most of the time filled more or less with exhaust matter or air, and by reason of this space so filled and surrounding the inner chamber the noise of the exhaust into this latter and of the discharge therefrom through openings 9 is effectually muffled and killed. The final exhaust into the atmosphere takes place through openings 11. In order to prevent a too-rapid escape into the atmosphere of the exhaust matter and to retard its passage through the device sufficiently to insure a proper operation of the intended function, the two sets of openings 9 and 11 are not directly opposite each other, so that the exhaust cannot pass from one directly to and out of the other. This retardation favors the filling of the outer chamber and a distribution therethrough of the exhaust matter, which additional expansion before final escape causes this matter to become attenuated to a degree which renders it harmless as a source of producing noise. This retardation may be increased as to degree by varying the size of the two sets of openings in such a manner that

the largest ones in each set are farthest apart from each other. Thus the tendency to direct escape from one chamber through the nearest holes in the other chamber is still more counteracted.

As to details of construction and manufacture, the device as to smaller sizes may be made of sheet metal, (steel,) as shown in Figs. 1 and 2, which may be stamped, shaped, and formed in the proper manner. A larger size, as Figs. 3 and 4 presume to show, may be made of cast metal. In either case the end of exhaust-pipe 6 which connects directly with the inner chamber is received by a nipple 12, the connection being by a screw-thread. In the sheet-metal construction this nipple is attached by bolts or rivets to the shell 13, forming the inner chamber. In the cast-iron construction (shown in Figs. 3 and 4) such is not necessary, and nipple and shell may form one casting. The ends of the device are closed by heads 14, which in the first case are held in place and to each other by a tie-rod 15, with shells 13 and 16 between them. In the construction shown in Figs. 3 and 4 the heads are attached to the ends of outer shell 16 by means of a screw-thread, with the inner shell 13 held between. It is preferable in all cases to have the ends of the inner shell resting in an annular groove 17 in the head. In the construction illustrated first these grooves are produced by a depression of the sheet metal. In the other case this groove may be produced by providing two annular projections, as shown in Fig. 4. It is preferable to have a lock-nut 18 on pipe 6, bearing against the outer shell. This requires a straight surface for it to bear against, which is obtained by a boss 19 on the outer shell. In the first construction, the shell being sheet metal, this boss forms, practically, a washer, concaved on its under side to fit the convexity of the shell and flat on its top to receive nut 18. In the case of cast-iron (shown in Figs. 3 and 4) it forms an integral part of the outer shell.

Having described my invention, I claim as new—

1. In an exhaust-muffler, the combination of an inner chamber having an inlet-opening adapted to receive the discharge end of an exhaust-pipe, an annular chamber surrounding this inner chamber, outlet-openings in part of the wall of the inner chamber, similar openings in part of the wall of the outer chamber, said openings being of increasing size and so arranged that the smallest openings in each set are closest to each other, while the largest ones are farthest apart.

2. An exhaust-muffler consisting of two cylindrical shells of equal length, arranged concentrically, one within the other and with a space between them, a head at the ends of each of the shells, means to hold them in position an inlet-opening in the inner shell, a nipple 12 thereat permitting attachment of the discharge end of an exhaust-pipe, discharge-openings in the inner shell and similar openings in the outer one.

3. An exhaust-muffler consisting of two cylindrical shells of equal length arranged concentrically, one within the other and with a space between them, a head at the ends of each of the shells, means to hold them in position, an inlet-opening in the inner shell permitting attachment of the discharge end of an exhaust-pipe, an opening in the outer shell registering with the opening first mentioned to permit the discharge end of said pipe to enter, a lock-nut 18 fitted to this latter and a boss 19 between it and the outer shell.

4. In an exhaust-muffler, the combination of a comparatively large inner chamber of cylindrical shape, an inlet-opening in its annular wall adapted for connection to the discharge end of an exhaust-pipe, an outer chamber of similar shape surrounding this inner one, an exhaust-pipe entering through the annular wall of the outer chamber and communicating at its discharge end with the inlet-opening in the wall of the inner chamber, discharge-openings in the wall of this latter whereby the same discharges into the outer chamber and perforations in the wall of this latter through which the final discharge of the exhaust into the atmosphere takes place.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

EMMET P. GRAY.

Witnesses:
C. SPENGEL,
ARTHUR KLINE.