No. 724,124. PATENTED MAR. 31, 1903.

W. J. PERKINS.

EXHAUST MUFFLER.

APPLICATION FILED DEC. 20, 1901.

NO MODEL.

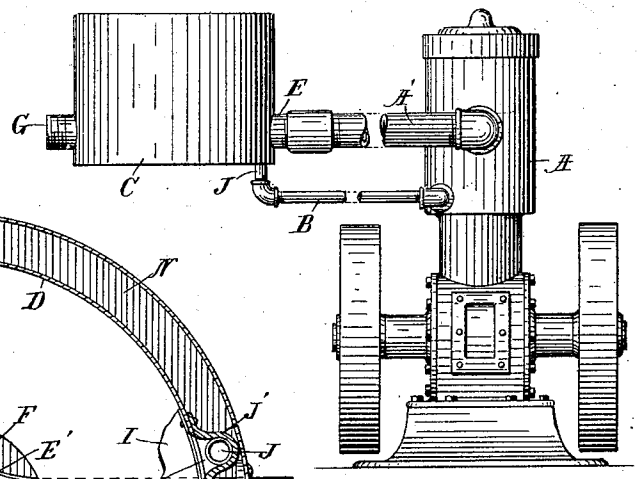


Fig. 1.

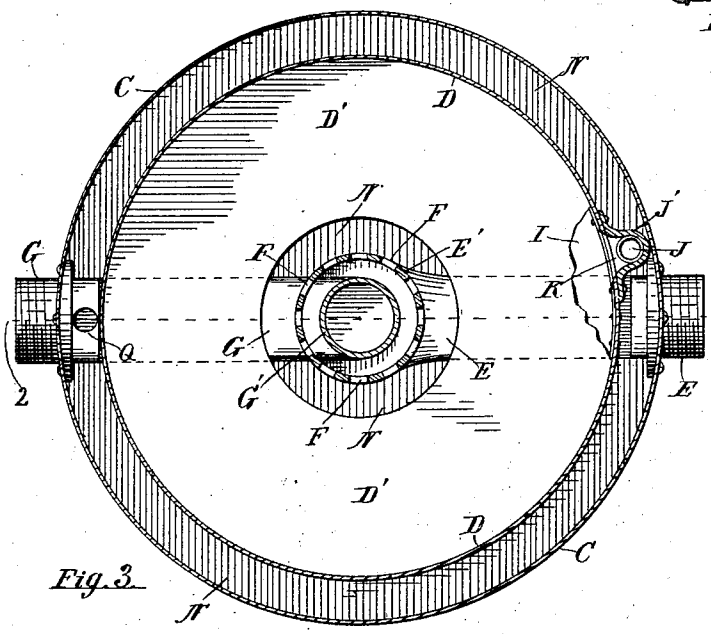


Fig. 3.

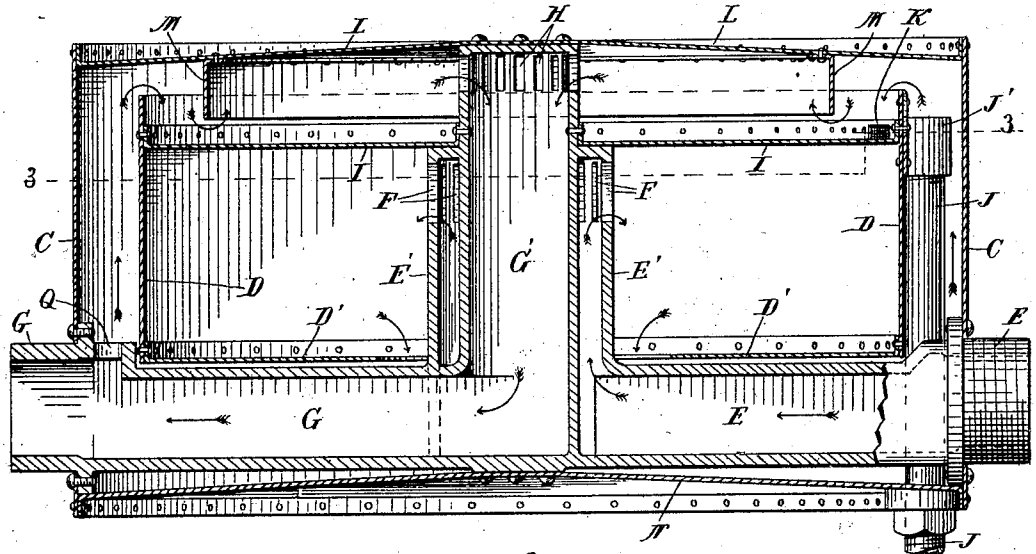


Fig. 2.

Witnesses
Palmer A. Jones.
Tyler E. Wheeler.

Inventor
Willis J. Perkins
By Luther V. Moulton
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIS J. PERKINS, OF GRAND RAPIDS, MICHIGAN.

EXHAUST-MUFFLER.

SPECIFICATION forming part of Letters Patent No. 724,124, dated March 31, 1903.

Application filed December 20, 1901. Serial No. 86,704. (No model.)

To all whom it may concern:

Be it known that I, WILLIS J. PERKINS, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Exhaust-Mufflers; and I do hereby declare the following to be a full, clear, 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.

My invention relates to improvements in exhaust-mufflers for combustible-vapor engines; and its object is to provide means for reducing the noise caused by the escape of the exhaust from such an engine, to eliminate the risk of fire from the exhaust, to reduce the back pressure on the engine due to the ordinary form of muffler, and to provide the device with certain new and useful features hereinafter more fully described, and particularly pointed out in the claims.

My invention consists, essentially, of a vessel containing a suitable fluid and means for forcing the exhaust from a combustible-vapor engine to pass through said fluid and in the combination and arrangement of parts, as hereinafter described, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of a device embodying my invention shown on a reduced scale and connected to an engine. Fig. 2 is an enlarged vertical section of the muffler, taken on the line 2 2 of Fig. 3; and Fig. 3, a horizontal section of the same, taken on the line 3 3 of Fig. 2.

Like letters refer to like parts in all the figures.

A represents any engine operated by the combustion of a vapor in its cylinder.

A′ is the exhaust-pipe of the engine, which pipe is connected to the intake-pipe of the muffler.

B is a pipe by which the cooling fluid escapes from the engine. This pipe is connected to the pipe J of the muffler and supplies the muffler with said fluid, or said muffler may be supplied from any convenient source with a fluid. The outer vessel may be of any convenient shape or construction and must be strong enough to hold the pressure and tight enough to hold the fluid. I prefer to construct it of a short cylindrical shell C and heads L and N secured thereto. I also prefer to strengthen the heads by securing them at the middle to each other. This is conveniently done by attaching them to the pipes, as shown. I prefer also to provide for permitting the exhaust to expand within the device, and for this purpose I provide an inner vessel, of smaller dimensions than the outer vessel, in the form substantially as shown, consisting of an outer shell D and heads I and D′. The head D′ has a central opening for the downward escape of the exhaust and is submerged in the fluid. The exhaust from the engine is admitted to this inner vessel in any convenient manner. I prefer substantially the means shown, consisting of a pipe E, submerged in the fluid and extending to near the middle of the device and thence upward within the inner vessel and open at the top. I prefer to provide the ports F for such opening. I also prefer to pass the exhaust through the fluid more than once and also to cool the inner vessel, and for this purpose I provide a tray above the said vessel. I find it most convenient to form this tray by extending the sides D above the upper head I. The fluid may be supplied to this tray in any convenient manner; but I have shown a vertical pipe J between the outer and inner vessels and provided with a cap J′, attached to the side of the tray, and an opening or port K through the side of the cap and tray, the bottom of this opening being close to the head I to facilitate drainage of the tray. To force the exhaust through the contents of this tray, I provide a downwardly-projecting flange M, with the lower edge submerged in the fluid in the tray. This flange may be integral with the upper head L or attached thereto, as may be most convenient, thus forming a closed chamber, within which is the open end of an escape-pipe to convey the exhaust out of the device. This escape-pipe may extend outward in any direction from within this chamber. I prefer to carry it downward through the vertical portion E′ of the inlet-pipe, as at G′, and thence horizontally outward beneath the inner vessel and submerged in the fluid, as at G. To limit the quantity of fluid in the lower part of the device, I provide an overflow-opening Q at the desired level. This opening is pref-

erably located in the upper side of the escape-pipe G.

I do not desire to limit my specification or claims to the precise construction shown, as it is obvious that many modifications may be made which would be substantially equivalents of my device without departing from the spirit of my invention; also, that any suitable fluid other than the cooling-water from the engine may be used, or any other source of supply of the same may be utilized.

The operation of my device is as follows: The fluid used (preferably the cooling-water from the engine) flows through the pipe J into the tray above the inner vessel and filling the same overflows at the top of the tray, thence downward over the sides of the inner vessel in a thin sheet and accumulates in the outer vessel, rising into the bottom of the inner vessel through the central opening D′ in the bottom until it reaches the level of the opening Q, through which it overflows and passes out of the muffler. Thus at all times the tray above the inner vessel and the lower part of the inner vessel contain a predetermined amount of fluid, and a constant flow of the fluid is maintained through the device.

The course of the exhaust or products of combustion is indicated by the arrows in Fig. 2. It enters through the pipe E and passing upward in the pipe E′ escapes through the ports F into the inner vessel D, thence passing downward through the central opening in the bottom D′ of the inner vessel, thence laterally outward through the fluid and beneath the bottom D′, thence upward between the inner and outer vessels and over the top of the latter, thence under the edge of the flange M and through the fluid in the tray, thence through the ports H, down the pipe G′, out through the pipe G, being finally mingled with the fluid escaping through the overflow-opening Q.

The following results are produced: The submerged pipe E partially cools the exhaust. It is next expanded within the inner vessel and further cooled and condensed. Said vessel being covered with fluid at the top, sides, and bottom is thus cooled and the vibration absorbed. The exhaust is now passed through the fluid a considerable distance as it escapes laterally beneath the inner vessel, and the submergence being slight but little back pressure on the engine is produced thereby. The exhaust then rises around the inner vessel and is further cooled by direct contact with the fluid flowing over the vessel. It is then again passed through the fresh and cooler fluid in the tray above the inner vessel and finally escapes by way of the escape-pipes, taking up in a spray the fluid that overflows through the opening Q. The pulsation and noise of the exhaust are thus absorbed, and all flame and heat are removed therefrom.

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

1. In combination with the exhaust-pipe of a combustible-vapor engine, a vessel containing a cooling liquid or fluid and a substantially flat surface arranged horizontally therein, to guide the exhaust through said liquid or fluid, substantially as described.

2. In combination with the exhaust-pipe of a combustible-vapor engine, two or more tanks arranged one within the other in series, means for partially filling the same with a fluid of regulated depth, means for passing the exhaust through said tanks in succession, and means for passing the exhaust downward through the fluid, as it escapes from one tank to another, substantially as described.

3. In combination with a combustible-vapor engine and the exhaust-pipe of the same, an inner vessel, an outer vessel inclosing the same, and two separate volumes of water contained in said vessels, and means whereby the exhaust charges are forced to pass through said volumes of water in succession, substantially as described.

4. In an exhaust-muffler, a vessel to contain a liquid, a horizontal plate submerged in said liquid, and means for forcing the exhaust from the engine to traverse the under side of the plate, and to pass through the liquid, substantially as described.

5. In an exhaust-muffler, a closed vessel to contain a limited quantity of liquid at the bottom, a tray near the top of said vessel, means for supplying liquid to the tray and vessel, and means for forcing the exhaust to pass through the said respective quantities of liquid, substantially as described.

6. In an exhaust-muffler, the combination of an outer vessel adapted to contain a limited amount of liquid, an inner vessel of less dimensions than the outer vessel and partially submerged in the liquid and having an opening at the bottom, an intake-pipe opening into the upper part of the inner vessel, and an outlet-pipe opening into the upper part of the outer vessel, substantially as described.

7. In an exhaust-muffler, an outer vessel adapted to contain a limited amount of fluid at the bottom, an inner vessel having an opening in the bottom, and partially submerged in the said fluid, a tray at the top of the inner vessel, means for supplying fluid to the tray, an inlet-pipe opening into the upper part of the inner vessel, and an outlet-pipe opening into the upper part of the outer vessel, substantially as described.

8. In an exhaust-muffler, a vessel adapted to contain a fluid and having an overflow-opening near the bottom, an inner vessel of less dimensions, and provided with an opening in the bottom, and partially submerged in the fluid, a tray at the top to contain a fluid, means for supplying fluid to the tray, a flange extending downward within the tray and with its lower edge submerged in the fluid in the tray, and an outlet-opening above the tray and within the flange, substantially as described.

9. In an exhaust-muffler, an outer closed vessel, an inlet-pipe extending horizontally near the bottom of said vessel, and thence extending vertically in the axis of the same, and having openings near the top, an inner vessel having an opening in the bottom surrounding the inlet-pipe, and a tray at the top, an outlet-pipe opening into the outer vessel above the tray and extending downward within the inlet-pipe, and thence horizontally through the side of the outer vessel, an overflow-opening in the outlet-pipe, a flange extending downward within the tray, and a pipe to supply fluid to the tray, substantially as described.

10. In an exhaust-muffler, a tray to contain a fluid, means for supplying the fluid to the tray, a closed vessel surrounding the tray, a flange attached to the top of the vessel and having its lower edge below the top of the tray and submerged in the fluid, means for admitting the exhaust to the closed vessel, and outside the flange and tray, and an escape-pipe opening into the closed vessel within the flange and above the tray, substantially as described.

11. In an exhaust-muffler, the combination of an outer vessel having a bottom provided with a raised middle portion, a tray supported within said vessel, a pipe extending vertically from the tray, and through the bottom, and a port in the side of the tray, and close to the bottom thereof and opening into the pipe, whereby the vessel and tray may be readily drained, substantially as described.

12. In an exhaust-muffler, the combination of a closed outer vessel having a bottom with a raised central portion, an inner vessel having a tray at the top, a cap attached to the side of the tray and having a lateral opening into the tray, and a pipe connected to the cap, whereby the vessel and tray may be drained, substantially as described.

13. In an exhaust-muffler, a cylindrical case, heads at each end of the case, a pipe in the axis of the case and attached to the respective heads to strengthen the same, and a lateral extension of the pipe extending through the side of the case, and ports in the pipe, substantially as described.

14. In an exhaust-muffler, the combination of an outer cylindrical vessel having heads at each end, an inlet-pipe extending through the side of the vessel and thence upward in the axis thereof, an escape-pipe extending vertically in the axis of the vertical part of the inlet-pipe and attached to the respective heads and having a lateral extension passing through the side of the vessel, lateral ports at the top of the escape-pipe, an inner vessel surrounding the vertical pipes and having a bottom opening, a tray at the top of the inner vessel, a cap attached to the side of the tray, an opening through the side of the tray and cap, and a pipe connected to the cap, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS J. PERKINS.

Witnesses:
J. W. BROWN,
PALMER A. JONES.