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CLEANING AND SILENCING MEANS FOR ENGINE EXHAUSTS

Filed March 29, 1929

2 Sheets-Sheet 1

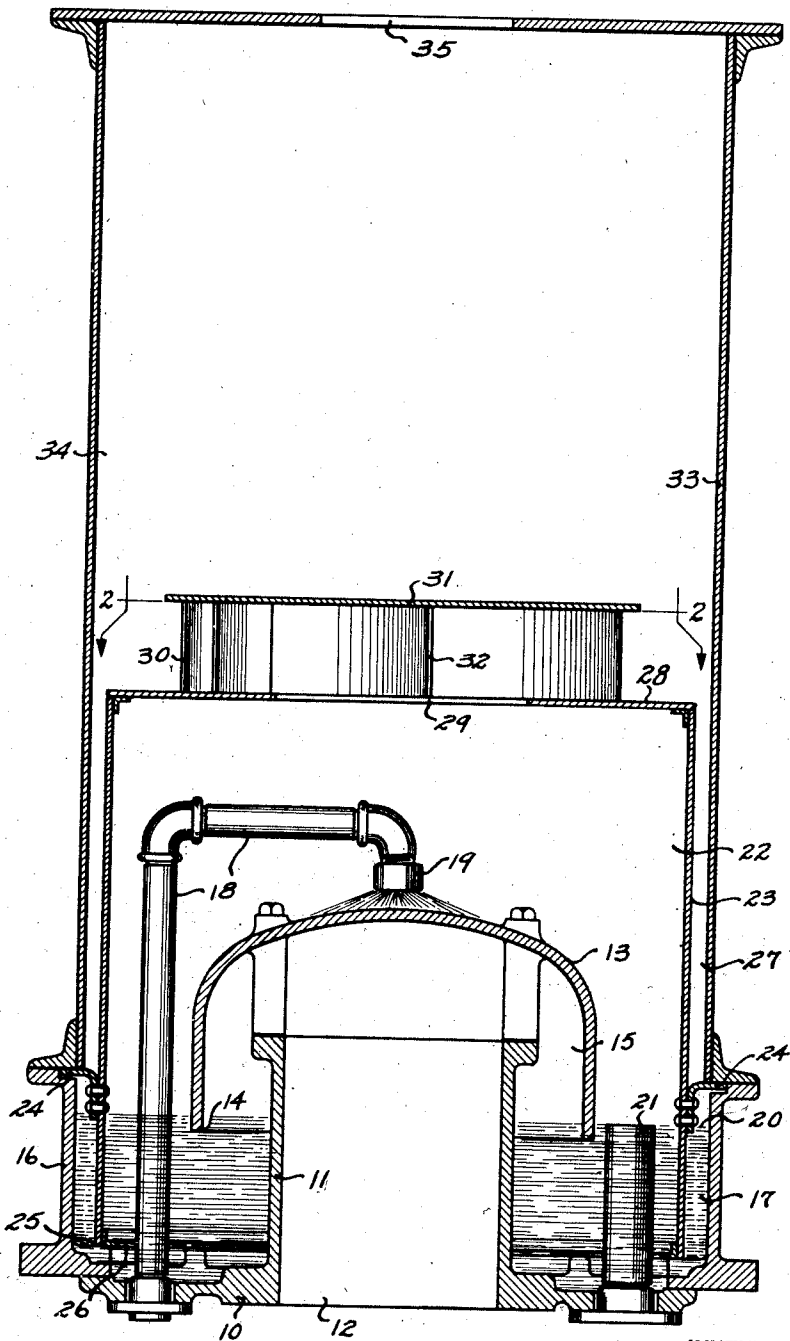


FIG. 1

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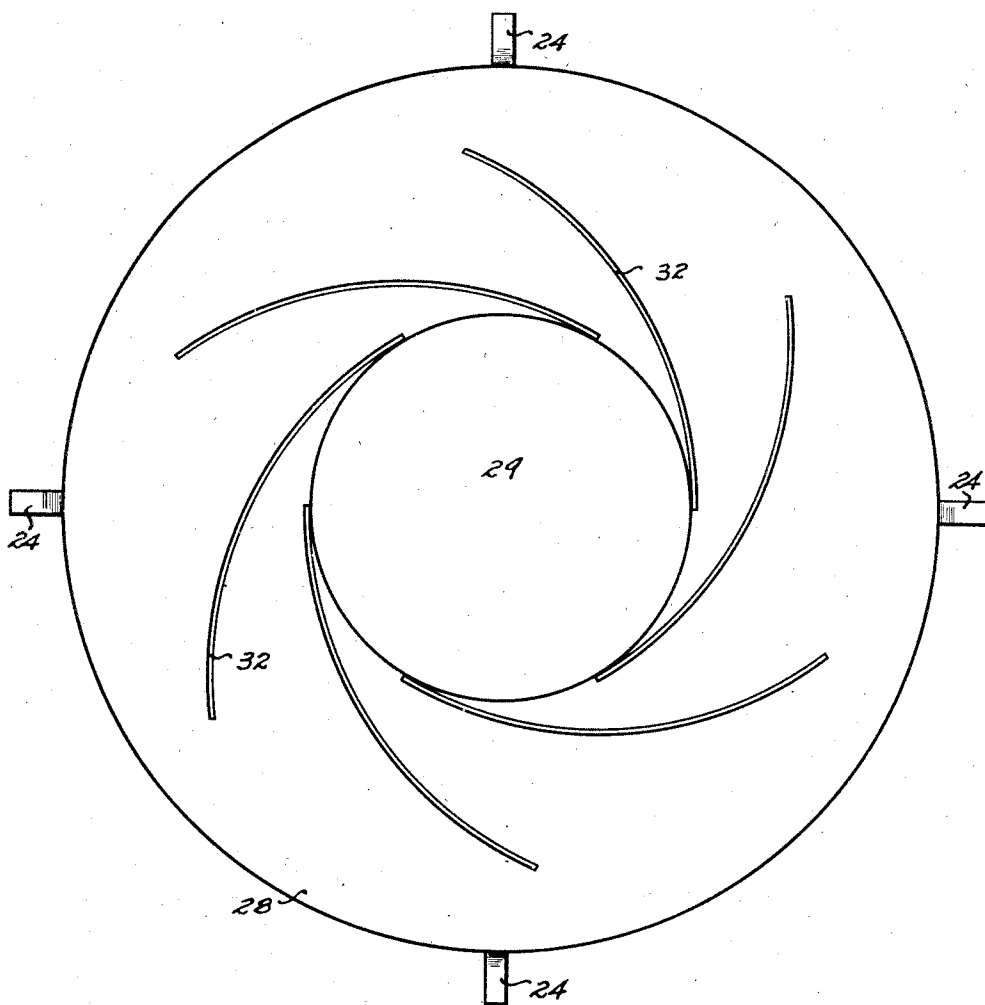


FIG. 2

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CLEANING AND SILENCING MEANS FOR ENGINE EXHAUSTS

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This invention relates to improvements in cleaning and silencing means for engine exhausts, and particularly to an exhaust attachment adapted for use with internal combustion engines.

An object of the present invention is to provide an improved device, in which is embodied means for silencing effectively the exhaust pulsations of internal combustion engines.

A further object is to provide an improved device, embodying means for separating, effectively, any foreign particles, such as carbon, sparks, or water, from the exhaust of internal combustion engines, before permitting the exhaust gases to be expelled to the atmosphere.

An additional object is to provide an improved device for the purposes set forth, which is neat and compact in arrangement, which is readily accessible in cases of necessary repair or cleaning, and which is economical to construct and maintain.

Further objects and advantages will appear from the following detailed description of parts and the accompanying drawings, in which, Fig. 1 is a sectional elevation of a preferred form of the device, and Fig. 2 is a plan view of certain internal portions of the device, as viewed along the line 2-2 in Fig. 1.

It will, of course, be understood that the present detailed description of parts and the accompanying drawings relate to a single preferred executorial embodiment of the invention, and that substantial changes may be made in the described construction and arrangement of the parts, without departing from the spirit and full scope of the invention.

Referring by numerals to the drawings, 10 designates a base casting, which includes an inwardly extending tube 11 serving as an inlet passage or compartment 12 for the exhaust gases from the engine. This passage

tends to direct the exhaust gases to points within the device. Mounted upon, and detachably secured to the inner end of the pipe 11, is a deflecting member 13, which in the preferred example, is formed substantially cup shaped and inverted, for purposes hereinafter appearing. A rim or edge 14 of the member 13, extends downwardly, and substantially surrounds a portion of the pipe 11, leaving an annular passage or compartment 15 between the member 13 and the pipe 11. It will be readily seen that the exhaust gases entering the tube 11 are deflected by a portion of the member 13 into the passage 15, and the direction of flow is thereby substantially reversed.

Mounted upon, and securely attached to the base 10, is a cylindrical member 16, which forms with the base 10, a basin or chamber 17 to which water is supplied. A water supply pipe 18 is detachably secured to the base 10, and extends upwardly and inwardly to a point substantially centrally of, and above, the cap member 13. This pipe is provided with a spray head 19 which serves to spray water on the outer wall of the deflecting member 13. By this arrangement, means is provided for cooling effectively the walls of the deflecting member 13, in order to present to the entering gases, a substantially cool deflecting surface, and further, by the pipe 18, provision is made for supplying water continuously to the basin 17. It will be readily understood that the spray head 19 may be so arranged as to spray a portion of the water, not only upon the member 13, but outwardly into the chamber in order further to cool the exhaust gases passing through this chamber.

In order to maintain a water level 20 in the basin 17, an overflow or drain pipe 21 is provided, which is detachably secured to the base 10. It will be readily seen that the water level 20 may be varied by the substitution of pipes 21 of different lengths. In the preferred example, such a length of pipe

21 has been chosen, that the water level 20 seals the rim 14 of the member 13. Under certain operating conditions, it may be found that by permitting the rim 14 to be above the water level 20, better performance is attained. By either arrangement the exhaust gases from the passage 15, either pass through the water, or impinge upon its surface, in such a manner as to throw down any solid particles it may carry. Further, the gases are so directed by the passage 15, that their direction is again reversed before they enter a chamber or compartment 22. The water is violently agitated by the impact of the exhaust, and a portion of the water is dispersed into finely divided mist and intermingled with the gases. By this arrangement, the exhaust impact is not only decreased, in order to silence the exhaust impulses, but the same means is utilized to extinguish effectively any burning carbon or sparks in the gases.

After passing the water level 20, the exhaust gases enter the chamber 22 formed by a cylindrical vessel or member 23. This member is substantially smaller in diameter than the water base 16, and is removably positioned upon the member 16, by means of lugs 24, securely attached to member 23. An end 25 of the member 23 extends downwardly into and is sealed by, the water in the basin 17, being in communication with the water in this basin, by means of an open bottom 26, which permits the water in the basin 17 to flow into the chamber 22. By reason of the smaller diameter of the member 23, an annular passage 27 is formed between the outer wall of the member 23 and the inner wall of the member 16. Further, the lugs 24 are so disposed, about and along the vessel 23, that the end 25 is supported an appreciable distance above the base 10. The vessel 23 is closed at the top by means of a plate 28 in which is provided an outlet opening 29 which permits the gases to pass from the chamber 22.

In passing from the chamber 22, the gases are directed into a baffle member 30, which is closed at the top by means of a plate 31. The baffle 30 includes guide vanes 32, which are so disposed and constructed, as to impart to the gases, a swirling or spiraling action, or a distinct turbulence, as they pass radially outward. An enclosing or stack member 33 is supported upon the lugs 24. This member is substantially the same diameter as the member 16, and thereby forms a continuation for the passage or compartment 27, for communication between the basin 17 and a chamber or compartment 34 formed thereby. As noted above, the gases passing through the baffle member 30 receive a whirling action, which tends to throw the heavier or water particles outwardly and against the inner wall of the member 33, whence these particles pass, by gravity, downwardly through the passage 27 to combine with the water in the basin 17. Then the whirling gases, being freed of the foreign particles, traverse an unimpeded space in the chamber 34, to be expelled to the atmosphere through an outlet opening 35 provided in the stack member 33. By the preferred arrangement of the baffle member 30, means is provided not only for separating and removing condensed vapor from the exhaust, but the same means is utilized to set up a whirling or retarding action, which action increases the path of travel and time in which the gases may fully expand in order to reduce and to silence, effectively, the engine exhaust pulsations.

A number of the advantages of the features of construction described in detail above, will be apparent from the description of parts. In existing types of internal combustion engines and especially in those constructed for marine use, the discharge of glowing particles, and the noise incident to the exhaust pulsations, has heretofore been a distinct disadvantage. In certain prevailing types of exhaust cleaners, some objection was encountered from drops of cooling water being thrown out into the atmosphere along with the exhaust. In the device described, the exhaust is effectively muffled, and all sparks, soot and condensed water are satisfactorily removed.

It is readily seen that the preferred arrangement of parts described in detail above, provides a device in which the exhaust gases are given a tortuous path of travel, in which ample time may be consumed to reduce the gases to a safe outlet temperature. Further, it will be seen, that provision is made for reclaiming the cooling water, and thereby greatly reducing the expense incident to the operation of the device. In fact, only a negligible amount of make up water need be added to the system.

It will be readily understood that the parts of the device are of simple construction for production economy, and are so related and arranged in the assembly, as to be easily accessible and removable.

I claim as my invention:

1. An exhaust silencer including a plurality of compartments, arranged one exteriorly of another, means for supplying a body of liquid to an inner one of said compartments, means for directing the engine exhaust gases into contact with said liquid, means formed by said inner compartment for conducting the gases from said liquid, means connected with said compartment for removing liquid particles carried by the gases, after being carried beyond said liquid, and means formed by an exterior compartment, for returning the separated particles to the body of liquid.
2. An exhaust silencer including a plurality of compartments, means for supply-

ing a liquid to portions of said compartments, means associated with one of said compartments for directing the engine exhaust into contact with the liquid in said compartment, means for removing condensed vapor from the gases, and means constituted by another compartment, disposed exteriorly of the first named compartment, for returning said condensed vapor by gravity to said first named compartment.

3. An exhaust silencer including a plurality of compartments, means for supplying a liquid to one of said compartments, an inlet conduit for directing the engine exhaust gases into contact with the liquid in said compartment, centrifugal means communicating with said compartment for removing water particles from said gases and means formed by a second compartment, exterior to the first named compartment, adapted to return said particles to the liquid in said first compartment and adapted to conduct exhaust gases away from said first named compartment.

4. In an exhaust silencer, means forming a plurality of compartments, disposed one within another, means for supplying a liquid to portions of said compartments, means for directing exhaust gases into contact with said liquid, and separating means adapted to effect return of any condensed vapor carried by the gases, through the outer compartment.

5. In an exhaust silencer, an enclosure having an inlet and an outlet opening, a gas deflecting member positioned opposite said inlet, means for supplying a liquid uniformly over the exterior surface of said member, and into said enclosure, means for maintaining a constant liquid level in said enclosure and about a portion of said deflecting member, means for centrifugally drying said exhaust gases, disposed between said inlet and outlet openings, and means for conducting liquid particles from said drying means to the body of liquid in said enclosure, and substantially out of contact with the gas flow through the silencer.

6. In an exhaust silencer, an enclosure having an inlet and an outlet opening, a deflecting member positioned opposite and adjacent to said inlet opening, means for supplying a fluid to said enclosure and member, and a baffle structure disposed between said inlet and outlet openings and having a plurality of radially disposed vanes adapted to impart a rotary movement to said exhaust gases, and arranged to direct the gases toward the walls of said enclosure.

7. In an exhaust silencer, an enclosure having an inlet and an outlet opening, a member disposed within said enclosure and spaced from a wall thereof, to form a passage between said member and enclosure, means for supplying a liquid to portions of said mem-

ber and enclosure, and a baffle member having vanes for imparting a rotary motion to the gases, said baffle member being adapted to separate heavier particles from the gases, and to deliver such particles to said passage for gravity return to the liquid in said enclosure.

8. In a cleaning and silencing device for engine exhaust gases, an enclosure having an inlet and an outlet, means for supplying a liquid to a portion of said enclosure, means for conducting the gases through the liquid, means disposed between said conducting means and outlet, for removing solid and liquid particles carried by said gases, and means forming a chamber for conducting gases away from the liquid, said chamber constituting with said enclosure, an annular return passage for particles removed from the gases.

9. In a cleaning and silencing device for engine exhaust gases, a container having an inlet opening and an outlet opening, means for maintaining a body of liquid in the container, a heat transferring member in said container, means for directing exhaust gases against one side of said member, means for directing a flow of cooling liquid against the opposite side thereof, said member extending substantially into the body of liquid and arranged to cause the passage of gas there-through, means between said member and outlet opening, for separating liquid particles from the gas, and a passage for returning said liquid particles to said body of liquid, said passage arranged to prevent admixture of such particles with the flow of gas through the device.

10. In a cooling and silencing device for engine exhaust gases, an enclosure having an inlet opening and a outlet opening, an inlet tube extending into the enclosure from the inlet opening, a heat transferring member disposed in said enclosure, and carried by said inlet tube, means for directing exhaust gases against one side of said member, means for directing a cooling liquid against the opposite side of said member, means for retaining a predetermined quantity of said cooling liquid in said container, means formed by said transferring member for directing the exhaust gases through a portion of the retained liquid means, beyond the heat transferring member, for drying the gases, and means within the enclosure for conducting liquid and gases in opposite directions from the drying means, and out of contact with each other.

11. In a cleaning and silencing device for engine exhaust gases, a container having an inlet and an outlet opening, means for maintaining a level of liquid in a portion of said container, an inlet fitting extending through said liquid, a heat transferring member associated with said inlet fitting, means for directing exhaust gases

against one side of said transferring member, means for directing a flow of cooling liquid against the opposite side of said member, means formed by said member for directing the gases through a portion of the body of liquid in the container, means for imparting turbulence to the gases after passing through said liquid, means forming a passage for the return of particles carried by the gases, to the body of liquid in the container, and means forming an expansion chamber within said container and directly connected to the outlet thereof.

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