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SPARK ARRESTER SILENCER

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Fig. 1.

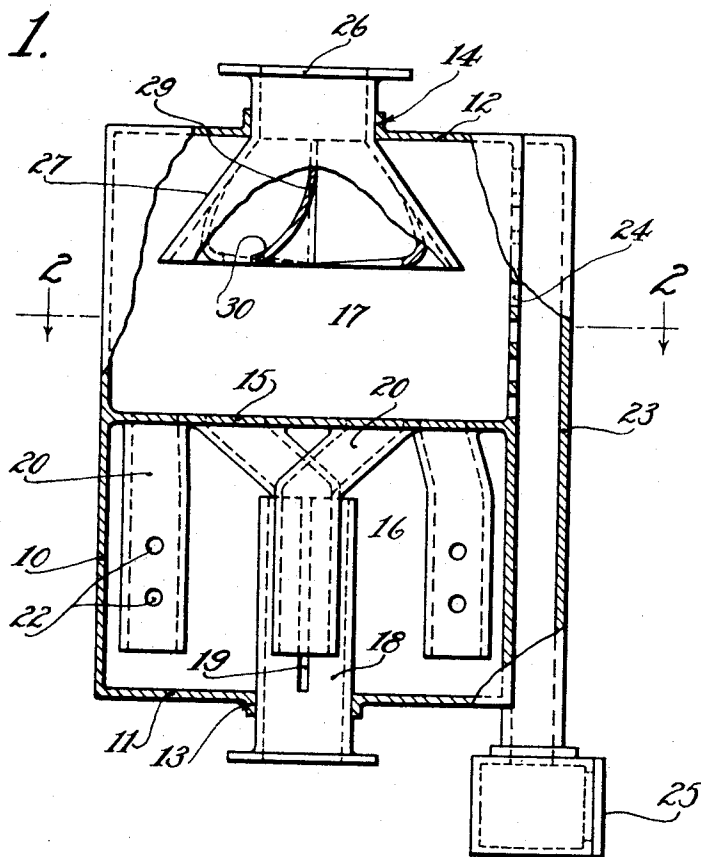
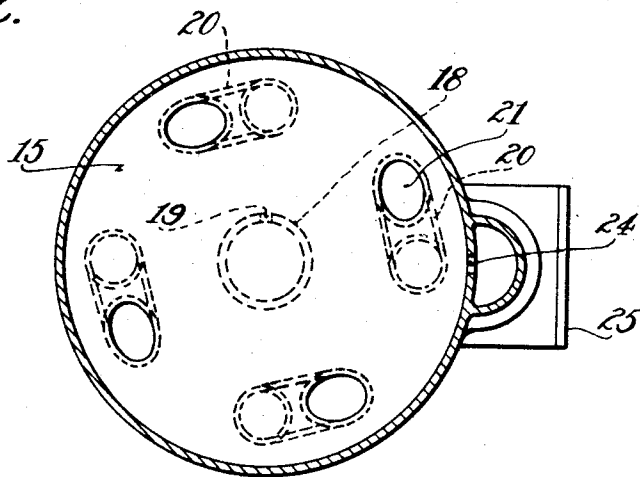


Fig. 2.



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SPARK ARRESTER SILENCER

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Application August 4, 1940, Serial No. 351,415

3 Claims. (Cl. 181—36)

The present invention pertains to devices for silencing the exhaust noise of internal combustion engines and the like, and at the same time removing from the exhaust gases all the entrained dirt, sparks, and the like.

The invention as disclosed accomplishes these results with very low back-pressure, even though devices of this type may be made with relatively low volumetric capacity. I have made successful devices after the teachings of my invention which are of relatively small size in comparison to devices heretofore used.

The invention involves the use of a retroverted gas flow type of silencer so constructed that the outlet tubes from the silencing chamber give the exhaust gases an upward whirling motion as they enter the dirt separating chamber, wherein the dirt and sparks are removed as will be hereinafter described. The exhaust gases pass out through a coaxially disposed outlet connection having anti-whirl means positioned therein.

For a complete description of my invention, I refer to the drawing, wherein,

Fig. 1 is a side view of the device, partly broken away;

Fig. 2 is a transverse section on line 2—2 of Fig. 1.

Referring to Fig. 1, the device comprises a generally cylindrical casing 10 having an inlet header 11 and an outlet header 12 with inlet and outlet openings 13, 14 disposed therein respectively. A transverse header 15 divides the interior of the casing into a lower silencing chamber 16 and an upper dirt separating chamber 17. Extending from the centrally disposed inlet opening 13 into the interior of the chamber 16 is the pipe 18, the open end of which terminates at a point in adjacency to the transverse header 15. The pipe 18 is provided with a slot 19 whereby is secured some gas and sound wave leakage into the chamber 16. This slot, which may be replaced by a series of perforations without prejudice to the operation of the device, preferably has a width of the order of one twentieth the pipe diameter. The gases pass from the chamber 16 into the chamber 17 through the four pipes 20 which are equally spaced around the inner periphery of the chamber 16 and have their bottom open ends in adjacency to the inlet header 11. The pipes 20 are bent to an angle of about 45 degrees at their upper ends and thus provide a whirling motion for the exhaust gases as they leave the pipes 20 through the elliptical apertures 21 in the transverse header 15. The upper ends of the bent pipes 20 are flush with

the surface of the header 15. In order to prevent the pipes 20 from "sounding off" due to shock excitation, they are provided with small apertures 22 positioned at points along their lengths substantially equal one half and one quarter the length of the pipes after the manner disclosed in my co-pending patent application Serial No. 291,820 filed August 25, 1939.

The upwardly whirling dirt-bearing gases throw the entrained dirt out against the inner smooth wall of the separating chamber 17 whence they eventually fall into the dirt collector tube 23 through the vertical row of apertures 24. The collected dirt falls unhindered into the dirt box 25 from whence it may be removed when necessary.

The exhaust gases having been freed of dirt now pass out through a co-axially disposed outlet fitting 26 which projects into the interior of the chamber 17 through the outlet opening 14, and expands outwardly into the chamber 17 in the form of a conical skirt 27. The conical section 27 is fitted with longitudinally disposed vanes 29, at least the lower edges of which are preferably curved to form scoop-like entrance vanes 30 whereby the whirling gases present below the lower end of the unit 27 are readily taken into the outlet unit and the whirl eliminated therein. This feature results in a great reduction of back-pressure. The conical surface 27 of the unit 26 prevents any dirt particles present in the upper end of the whirl chamber 17 from working down to the open end of the outlet unit 26 whence they might otherwise be carried into the outlet exhaust gas stream. The diameter of the skirt 27 should be as large as possible in the interests of low back-pressure but not so large as to interfere with the proper dirt separating action of the whirl chamber.

It will be seen that the device as a whole is a highly compact and efficient spark arrester silencer. The use of the inclined silencing tubes as gas whirlers eliminates the necessity for separate gas whirling means. A very vigorous whirl is given the gases, resulting in efficient cleaning. The high back pressure ordinarily associated with rapidly whirling gases in a chamber is reduced to about one quarter or less of its former value by the use of vanes structure in the outlet connection. This advantage is directly reflected in the smaller diameter of the whirl chamber thus made possible.

I claim:

1. A spark arrester silencer comprising a generally cylindrical vertical casing divided by a

transverse partition positioned at an intermediate point along its length into a lower silencing chamber and an upper dirt separating chamber, said silencing chamber having an inlet conduit extending from an inlet opening thereinto to a point in adjacency to said transverse header, one or more conduits bent at their upper ends attached to and depending from said transverse header at outlet openings therein into said silencing chamber so as to form a silencer of the retrogressive gas flow type, the upper ends of said open ended bent conduits being flush with the surface of said transverse partition whereby an unimpeded whirling motion of gases in said separating chamber may take place, dirt collecting means associated with said dirt separating chamber comprising an exteriorly disposed longitudinal tubular member having a dirt box at its lower end and being completely closed except for one or more apertures in the wall of the cylindrical casing through which dirt particles may pass from said dirt separating chamber into said exteriorly disposed tubular member, and a gas outlet connection comprising an open conical member projecting into the interior of said whirl chamber and having disposed within said conical member one or more anti-whirl vanes.

2. A spark arrester silencer comprising a generally cylindrical silencer chamber and a generally cylindrical dirt separating chamber in axial alignment therewith, a gas inlet pipe entering and extending a substantial distance into the silencer chamber, a plurality of open-ended con-

duits opening into the dirt separating chamber and extending a substantial distance into the silencer chamber, said conduits having lateral openings within the silencer chamber and having their portions adjacent the dirt separating chamber arranged in a generally helical manner to impart a whirling motion to the gases, and one or more dirt escape openings formed in the wall of the dirt separating chamber.

3. A spark arrester silencer comprising a generally cylindrical silencer chamber and a generally cylindrical dirt separating chamber in axial alignment therewith, a gas inlet pipe entering and extending a substantial distance into the silencer chamber, a plurality of open-ended conduits opening into the dirt separating chamber and extending a substantial distance into the silencer chamber, said conduits having lateral openings within the silencer chamber and having their portions adjacent the dirt separating chamber arranged in a generally helical manner to impart a whirling motion to the gases, one or more dirt escape openings formed in the wall of the dirt separating chamber, a gas discharge conduit opening out of the dirt separating chamber and positioned substantially axially thereof, the portion of the discharge conduit within the dirt separating chamber being formed as a cone converging towards the outlet, and a plurality of radial vanes within said cone concave towards the oncoming whirling gas.

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