

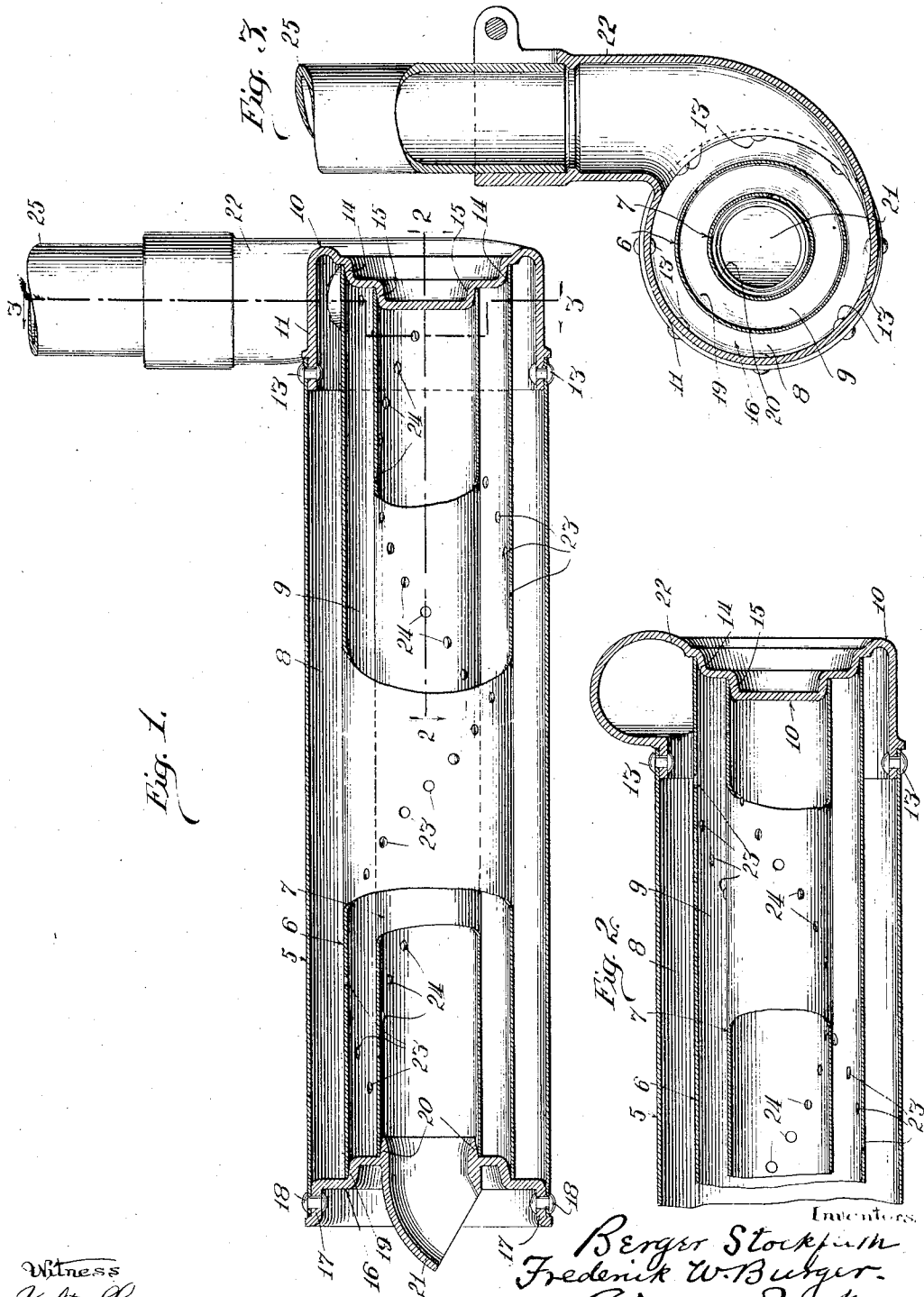
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MUFFLER FOR GAS ENGINES

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MUFFLER FOR GAS ENGINES.

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This invention relates to improvements in mufflers adapted to be connected with the exhaust pipes of internal combustion engines to muffle or silence the noise created by the explosions in the engine cylinders, and has for its leading object to provide novel means for causing the escaping gases to take a circuitous path through the muffler so that prior to their discharge they will be materially reduced both in volume and velocity and will escape from the outlet end of the device substantially wholly freed from any sparks and in a comparatively cool condition, and without appreciable noise. It is further the object of the invention to provide a construction of muffler the several parts of which can be readily and cheaply manufactured and easily assembled, and which when assembled will be strong and durable. These objects we accomplish as shown in the drawing and hereinafter described. That which is believed to be new will be pointed out in the claims.

In the drawing:

Fig. 1 is a vertical section through a muffler embodying the invention;

Fig. 2 is a horizontal section through the receiving end portion of the muffler, the section being taken on the line 2—2 of Fig. 1; and

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1.

Referring to the several figures of the drawing, 5, 6 and 7 indicate, respectively, three cylinders concentrically arranged with respect to each other and so arranged with relation to each other as to provide an outer chamber 8 between the outer cylinder 5 and the intermediate cylinder 6, an inner or intermediate chamber 9 between said intermediate cylinder and the inner cylinder 7, and a central or innermost chamber 10^a, which is the interior of the latter cylinder. The device is provided at each end with a head, the head at the gas-receiving end of the device acting as a closure for the ends of the chambers 8 and 9, and also for the central chamber 10^a within the inner cylinder 7. This head is indicated by 10, and as shown it is provided with an annular flange 11,

over the marginal portion of which is telescopically fitted the cylinder 5, which is secured thereto by rivets 13. The end portion of the head 10 is formed to provide two inwardly-directed shoulders 14, 15 over which the inner ends of the cylinders 6 and 7 extend and upon which they rest. The other head referred to is indicated by 16, and, like the head 11, it is provided with an annular flange 17 upon which the outer end of the cylinder 5 fits telescopically, and is secured thereto by a series of rivets, which rivets are indicated by 18. It is also provided with inwardly extending annular shoulders 19 and 20 upon which the outer ends of the cylinders 6, 7 respectively rest. It will be seen that by this construction the inner or intermediate chamber 9 is closed at both ends; that the outer chamber 8 is closed at one end by the head 16, and that the central chamber 10^a is closed at the opposite end by the head 10, which also overlies the adjacent end of the outer chamber 8 and connects the inlet pipe hereinafter described therewith. The two heads are substantially alike so far as affording support to the three cylinders, but the head 16, unlike the head 10, does not act as a closure for the central chamber 10^a but, as clearly shown in Fig. 1, there is formed with this head 16 a short spout or nozzle 21, through which the spent gases escape to the atmosphere. The two heads are preferably formed of castings, the discharge spout 21 being cast integral with the head 16. By reason of the riveting of the outer cylinder to the two heads such heads are held in immovable relation to each other, and, therefore, it is not necessary to rivet the cylinders 6 and 7 in place as they will be held firmly in proper positions by the shoulders on which they respectively rest.

Formed with the head 10 is an inlet pipe 22 that is preferably curved as shown and that is in communication tangentially with the outer chamber 8, and to the upper end of this pipe 22 is connected in any suitable manner the lower end of the exhaust pipe of the engine. By this arrangement a whirling motion is imparted to the gases admitted to the chamber 8, so that they flow around

said chamber in contact with the outer wall thereof as well as longitudinally of said chamber.

The wall of the outer casing 5 is, of course, imperforate, but the walls of the casings 6 and 7 are respectively perforated with a large number of openings which are preferably in the form of round holes because of the comparative ease of forming such shaped openings, but which, of course, may be of any other desired shape. The openings in the cylinder 6 are indicated by 23, and those in the inner cylinder 7 by 24, and as clearly shown in the drawings the series of openings in each of the cylinders is arranged in the form of a spiral extending from end to end thereof.

The hot gases and other products of combustion entering the muffler tangentially through the head 10 from the exhaust pipe 25 and muffler pipe 22, proceed through the chamber 8 in spiral fashion and are cooled by contact with the wall of the outer cylinder 5, which is exposed to the atmosphere. As the gases cool they lose velocity and can pass into the chamber 9 through the holes 23 as they flow along and become cooler, so that the gases that have cooled do not have to pass to the end of the chamber 8 to be crowded out with the hot gases, as would be the case if the perforations in the cylinder 6 were grouped at the outer end thereof. This gradual dissipation through the holes 23 from the time the gases start through the chamber 8 causes greater heat dissipation and gradually slows down the velocity of the gases without any great impediment to the same, so that back pressure is avoided. The gases passing into the chamber 9 will spread out therein and in like manner will be gradually dissipated through the holes 24, through which they are admitted to the inner cylinder 7, from which they escape through the nozzle 21, this action being by reason of the spiral arrangement of the series of said openings 24. Therefore, by the time the gases have passed into the interior of the inner cylinder 7 they will not only have been deprived of a large part of the heat that they had when entering the muffler, so that danger from any sparks or highly heated gases is avoided, but the pressure is so reduced that the products of combustion will pass out from the cylinder 7 through the member 21 without any objectionable noise.

What we claim as our invention and desire to secure by Letters Patent, is—

1. A muffler comprising in combination two cylinders one within the other and spaced a distance apart to provide an outer chamber closed at its outer end, and an inner chamber closed at both ends, a series of perforations in the wall of the inner cylinder extending substantially from end to end

thereof for admitting gases from the outer to the inner chamber, an outlet adjacent to one end of the muffler and communicating with the inner chamber for discharging the gases to the atmosphere, and means adjacent to other end of the muffler for admitting gases tangentially to the outer chamber.

2. A muffler comprising in combination two cylinders one within the other and spaced a distance apart to provide an outer chamber closed at its outer end, and an inner chamber closed at both ends, a series of spirally disposed perforations in the wall of the inner cylinder extending substantially from end to end thereof for admitting gases from the outer to the inner chamber, an outlet adjacent to one end of the muffler and communicating with the inner chamber for discharging the gases to the atmosphere, and means adjacent to the other end of the muffler for admitting gases tangentially to the outer chamber.

3. A muffler comprising two cylinders one within the other and spaced a distance apart to provide inner and outer chambers, heads at the ends of said cylinders having inwardly directed shoulders upon which the end portions of the inner cylinder are telescopically fitted, forming closures for the ends of said chambers, one of said heads having an opening over one end of the inner cylinder communicating tangentially with the outer chamber for the admission of gases thereto, a series of perforations disposed longitudinally of the inner cylinder, and an opening in the other head in communication with the inner chamber for the discharge of the gases.

4. A muffler comprising three cylinders arranged within one another and spaced apart to provide chambers between them, heads at the opposite ends of said cylinders and telescopically fitted thereto, one of said heads having an inlet opening communicating tangentially with the outermost chamber, and the other of said heads having a discharge opening communicating with the innermost chamber, and a series of perforations in each of the inner cylinders extending substantially from end to end thereof.

5. A muffler comprising three cylinders arranged within one another and spaced apart to provide chambers between them, heads at the opposite ends of said cylinders and telescopically fitted thereto, one of said heads having an inlet opening communicating tangentially with the outermost chamber, and the other of said heads having a discharge opening communicating with the innermost chamber, and a series of perforations in each of the inner cylinders extending substantially from end to end thereof, said perforations being spirally arranged.

6. A muffler comprising in combination three cylinders of different diameters ar-

ranged within one another and spaced a distance apart to provide outer, intermediate and central chambers, heads at the ends of said cylinders upon which the end portions 5 of said cylinders are telescopically fitted, forming closures for the ends of said chambers, one of said heads having an opening communicating tangentially with the outer chamber for the admission of gases thereto, the other head having an opening communi- 10 cating with the central chamber for the discharge of gases from the muffler, and a series of perforations in the walls of the inner cylinders extending substantially from end to end thereof.

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