April 16, 1935. H. S. POWELL 1,998,386

MUFFLER FOR INTERNAL COMBUSTION ENGINES

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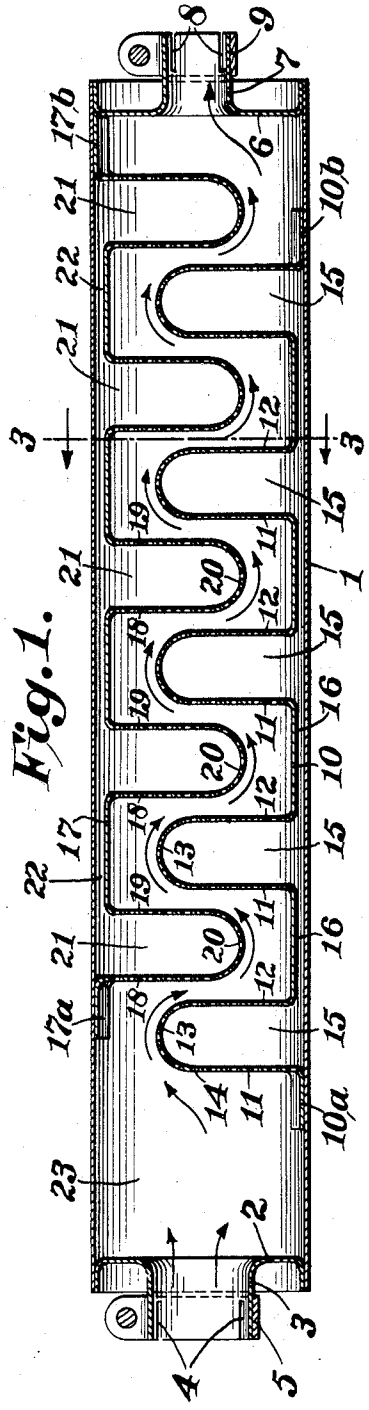


Fig. 1.

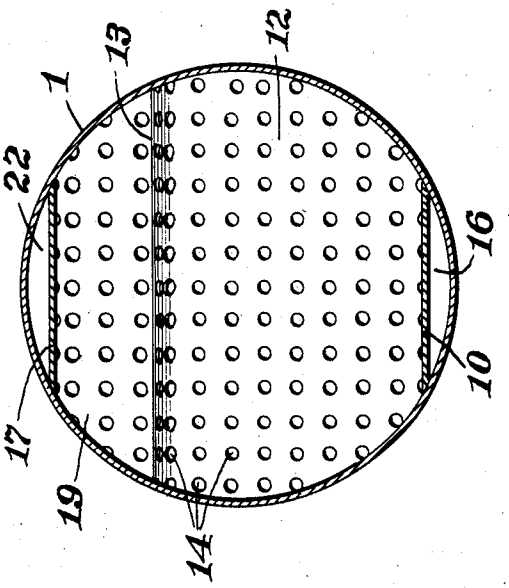


Fig. 3.

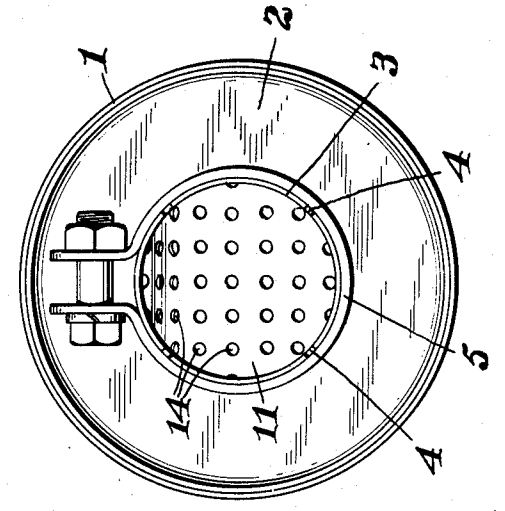


Fig. 2.

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MUFFLER FOR INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 137—160)

The invention relates to new and useful improvements in a muffler for expanding gases, and more particularly a muffler for internal combustion engines.

An object of the invention is to provide a muffler through which the exhaust gases pass in a sinuous path, and wherein there are substantially closed pockets at each side of the path of travel of the gases, into and through which pockets the gases may pass by expansion for reducing the extent of the negative and positive impulses incident to the discharge of the exhaust gases from the engine.

A further object of the invention is to provide a muffler of the above type wherein the walls constituting the sinuous path are so disposed as to form a relatively thin flat column of flowing gases.

A still further object of the invention is to provide a muffler of the above type wherein the noise incident to the expansion of the gases is silenced in part by the expansion chamber at the receiving end of the muffler, in part by the perforated baffle plates arranged to provide the sinuous path through which the gases pass from the expansion chamber to the outlet end of the muffler, and in part by substantially closed pockets extending into the baffle plates into and through which the exhaust gases expand and pass.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawing which shows by way of illustration one embodiment of the invention—

Figure 1 is a view in longitudinal cross section through a muffler embodying the improvements;

Fig. 2 is a view of the front end of the muffler, and

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

The improved muffler or silencer for exhaust gases of an internal combustion engine includes an elongated casing which may be of any desired cross sectional shape. The exhaust gases enter one end of the casing and pass out of the other end thereof. In the casing is a plate which is bent so as to provide spaced walls connected by an integral curved section at their inner ends. These walls form pockets and the walls are perforated so that the gases moving along the walls may pass through the perforations into the pockets. These spaced walls with the connected curved ends form a baffle plate, and these baffle plates are spaced from each other. There is a similarly shaped plate at the other side of the casing which is bent to form spaced walls, with a curved outer end, and the walls are perforated in the same manner. These two plates are dimensioned and placed so that the baffles are staggered, and this produces a sinuous or tortuous path through which the exhaust gases pass throughout a greater portion of the length of the casing. The baffle plates are preferably spaced away from the receiving end of the casing so as to provide an expansion chamber. The walls of the pockets are flat, and this produces a relatively thin flat column of flowing gas.

It is thought the invention will perhaps be better understood by a detail description of the illustrated embodiment thereof. The muffler consists of a casing 1, which as shown in the drawing, is circular in cross section and the casing is elongated to form a relatively long cylindrical casing, receiving the exhaust gases at one end thereof and discharging the same from the other end thereof. At the inlet end of the casing there is a partition 2 having a neck portion 3 which is provided with slots 4 and a clamping collar 5 which encircles the neck portion and is adapted to clamp the same to the pipe leading from the engine. At the discharge end there is a partition 6 having a neck portion 7 provided with slots 8 and a clamping collar 9 to which the discharge pipe may be attached. Within the casing is a plate 10. This plate 10 is bent so as to provide spaced walls 11 and 12, which walls are connected at their inner ends by a curved member 13. The walls 11 and 12, including the curved member 13, are provided with a number of small perforations indicated at 14. It is understood, of course, that these perforations may be varied in size and in number to suit the requirements. The portion 10^a of the plate 10 is secured to the inner wall of the casing, and the walls 11, 12 and 13 form a baffle plate extending part way across the casing. Within these walls 11, 12 and 13 is a pocket or chamber 15. The plate 10 is shaped so as to provide a series of these pockets or baffle plates, like the one just described. As shown they are all similar in construction and like reference numerals have been applied thereto. The pockets or baffles may, however, be otherwise shaped and differently shaped at opposite sides of the muffler. These baffle plates having the pockets or chambers therein are spaced from each other and the portion of the plate between the baffle plates is shown as spaced away from the casing, thus providing a small connecting port 16 joining adjacent pockets or chambers. The plate 10 is provided with a portion 10^b near

the discharge end of the casing 1, which is secured in any desired way to the casing. There is also a plate 17 formed with parallel walls 18 and 19 with a connected portion 20, which are similar in construction to the walls 11, 12 and 13. There is a pocket between these walls indicated at 21. There are a series of these baffle plates having pockets or chambers therein, and the walls are all perforated just as described in connection with the walls 11 and 12. The plate 17 has a portion 17a which is attached to the casing adjacent the inner end thereof and a portion 17b which is attached to the casing at the outlet end of the casing. This plate 17 is shaped so as to provide connecting ports 22 of small dimensions between the adjacent pockets. These ports 16 and 22 may be omitted, if desired, so as to provide isolated pockets or chambers in the respective baffles. The plate 17 is so positioned in the casing that the baffle plates formed therein are staggered relative to the baffle plates formed in the plate 10. The plates are so dimensioned that there is a relatively short distance between the walls 12 and 18, and also between the walls 19 and 11 of the next adjacent pocket. This passage between the plates extends all the way across the casing, and this results in producing a column of gas which is relatively thin and wide, and which travels in a sinuous path between and around the curved ends of the baffles. The plates 10 and 17 are spaced from the partition 2 so as to provide an expansion chamber 23. The gases entering the receiving end of the muffler are expanded in the chamber 23 and are partly silenced through this releasing of the gases into the chamber which is of much larger diameter than the neck portion 3 at the receiving end of the casing. The passing column of gas will contact with the walls of the baffle plates, and the negative and positive impulses in the gases will cause the gases to flow through these small openings into and out of the pockets or chambers in the baffle plates, thus cushioning and breaking up the regular impulses. Some of the gases will pass through the perforations in the opposite wall of the baffle plate and intercept the flow of the main column of gases, and this aids in the breaking up of the regular impulses and causing an even flow, or nearly so, at the time when the gases reach the end of the muffler. There are three distinct features in the muffler which contribute to the silencing of the noise incident to the release of the exhaust gases through the engine. First, is the chamber 23 into which the gases expand and the regularity in the impulses in part broken up or reduced. Second, the gases pass about the baffles in a sinuous path of travel, which further breaks up the regularity of the impulses and reduces the same. Third, the gases pass through the perforations into the pockets, and as they pass into and out of the pockets, there is a cushioning effect in the expansion of the gases, which again reduces the regular impulses, bringing the same down to a more nearly continuous flow before the gases reach the discharge end of the casing. As noted above, the casing instead of being circular in cross section, may be of any desired shape. The baffle plates may be attached to the casing in any desired way. The invention is not particularly in the details of construction, but rather in the arrangement of the baffle plates so as to provide the pockets and the expansion chamber, all of which contribute to the silencing of the expansion of the gases as they pass through the muffler.

It is obvious therefore, that many changes in the details of construction and the shaping of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is—

1. A muffler comprising a casing through which the exhaust gases pass, a plate at each side of the casing attached thereto at its ends and shaped intermediate its ends so as to form baffles spaced from each other with the baffles in the respective plates arranged so as to provide a series of communicating substantially U-shaped passages whereby to form a sinuous passage between said baffles for the travel of the gases, each baffle consisting of spaced connected perforated walls forming a chamber therein into and through which the gases moving along said walls may pass, said plate being shaped so as to provide ports connecting the adjacent chambers at the respective sides of the casing.

2. A muffler comprising a casing through which the exhaust gases pass, baffles connected to the opposite sides of said casing and arranged to form a sinuous path for the travel of the gases through said casing, each baffle consisting of spaced perforated walls having the inner ends thereof connected whereby to form an unobstructed chamber in which and through which the gases moving along said walls may pass.

3. A muffler comprising a casing through which the exhaust gases pass, baffles secured to the casing at opposite sides thereof and arranged to form a sinuous path for the travel of the gases through the casing, each baffle consisting of a substantially U-shaped perforated wall having the connected end disposed adjacent the center of the casing and forming an unobstructed chamber into which and through which the gases passing along the wall may pass.

4. A muffler comprising a casing through which the exhaust gases pass, plates secured to the casing at opposite sides thereof and each plate being shaped intermediate its ends to provide spaced baffles, the baffles in each plate being arranged to provide a sinuous path for the travel of the gases therebetween, each baffle consisting of spaced perforated walls having the inner ends thereof connected whereby to provide an unobstructed chamber into which and through which the gases moving along said plates may pass.

5. A muffler comprising a casing through which the exhaust gases pass, plates secured to the casing at opposite sides thereof and each plate being shaped intermediate its ends to provide spaced baffles, the baffles in each plate being arranged to provide a sinouus path for the travel of the gases therebetween, each baffle consisting of a substantially U-shaped perforated wall having the connected end disposed adjacent the center of the casing and forming an unobstructed chamber into which and through which the gases moving along the wall may pass.

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