Nov. 12, 1929. H. S. POWELL 1,735,789

MUFFLER

Filed Aug. 27, 1926 2 Sheets-Sheet 1

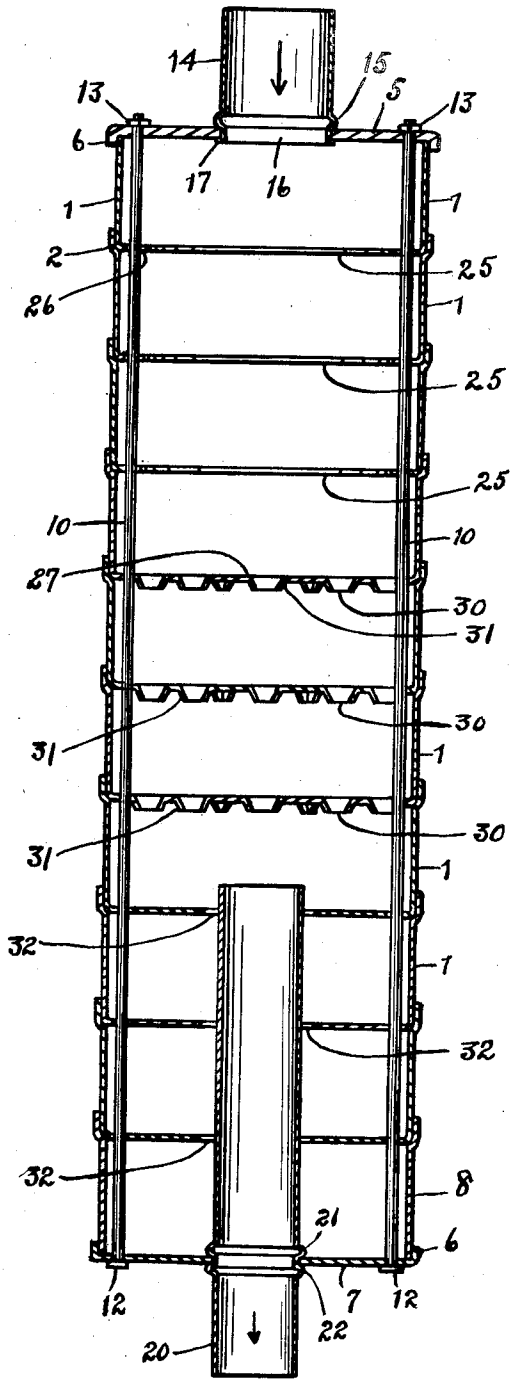


Fig. 1.

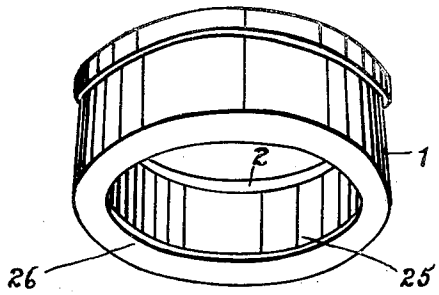


Fig 2

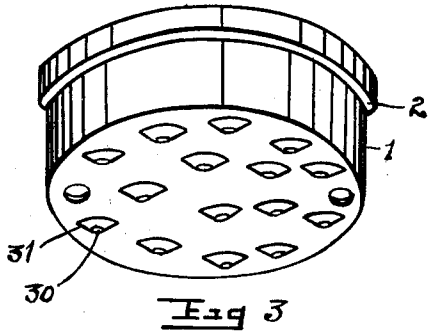


Fig 3

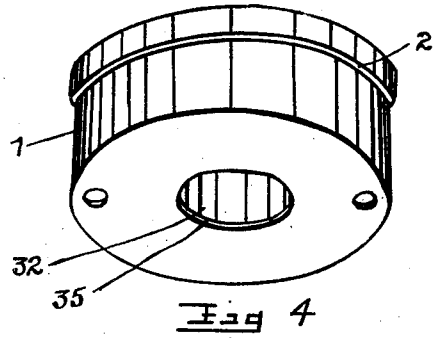


Fig 4

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Filed Aug. 27, 1926 2 Sheets-Sheet 2

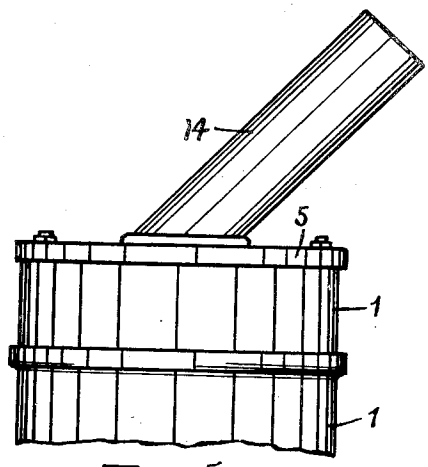


Fig 5

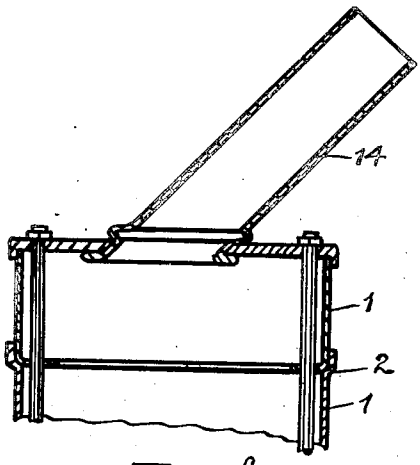


Fig 6

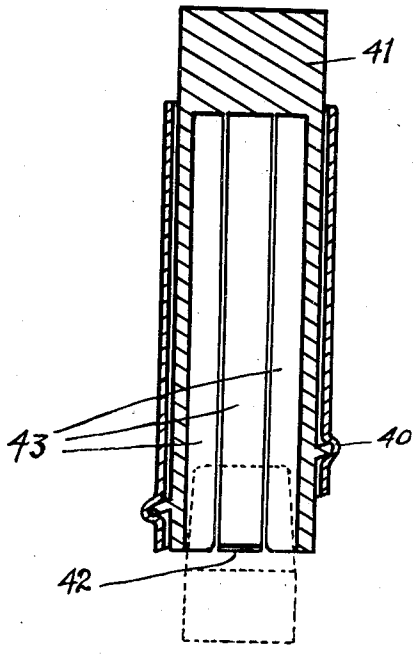


Fig 7

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Patented Nov. 12, 1929 1,735,789

UNITED STATES PATENT OFFICE

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MUFFLER

Application filed August 27, 1926. Serial No. 131,877.

My invention relates to a muffler and I declare the following to be a full, clear, concise and exact description thereof sufficient to enable anyone skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings in which like reference characters refer to like parts throughout the specification.

The object of the invention is to provide a device that will muffle the sound incident to the discharge of the exhaust gases from an internal combustion engine and at the same time to prevent any appreciable degree of back pressure on the engine. To this end, the the muffler embodies an expansion chamber, where the gases are received immediately they come from the engine. This chamber is constructed in such manner that there is little or no obstruction to the passage of the gases. The next succeeding chamber, however is equipped with small apertures adapted to segregate the gases. From here they pass into still another chamber provided with a tube leading direct to the atmosphere as well as a pocket that will cause part of the gases to take a tortuous course before leaving the muffler through the tube aforementioned.

The object will be understood by referring to the drawings, in which

Fig. 1 is a central vertical section of the muffler showing parts in full.

Fig. 2 is a detail perspective view of a cup employed.

Fig. 3 is a detail perspective view of another form of cup employed.

Fig. 4 is a detail perspective view of still another form of cup employed.

Fig. 5 is a side elevation of a fragment of the muffler showing a modified manner of attaching a pipe thereto.

Fig. 6 is a central vertical section of the muffler showing the modified manner of attaching a pipe thereto.

Fig. 7 is a central vertical section showing the means for forming a bead in the pipe attached in the muffler.

Referring more particularly to the drawings, the device embodies a series of cup-shaped members 1 that are nested together by flaring out the edge of each cup, except the first to form a seat 2 for the reception of the base of the preceding cup. End member 5 having an annular flange 6 is used to close the end of the muffler at which the exhaust gases enter and end member 7 having an annular flange 6 is used to close the end at which the exhaust gases escape to the atmosphere. Cup 1 adjacent end member 7 has no base part as the others but only a lateral wall 8, which fits snugly against annular flange 6 of member 7. Two stay rods 10, 10 disposed at diametrically opposite positions and projected through suitable apertures formed in end members 5 and 7 and through apertures in the bases of cups 1 are used to hold the several cups 1 and end members 5 and 7 together. Rods 10 are headed at one end, as at 12 and threaded at the other for the reception of nuts 13.

End member has a large central aperture through which projects pipe 14 for conducting the exhaust gases to the muffler. The surface of end member 5 adjacent said central aperture is formed on an angle or bevel. Pipe 14 is spinning or otherwise fastened in an air tight manner to end member 5 by forming an annular bead 15 adjacent end 16 and then pressing end 16 down flat against the inner surface of end member 5, thereby creating an annular flange 17 to seal the joint.

Outlet pipe 20 is smaller in diameter than inlet pipe 14 and is united to the end member 6 in an air tight manner by spinning or otherwise fastening the parts together. This is done by forming annular beads 21 and 22 in pipe 20 and pressing them against the opposite sides of end member 6. Moreover, pipe 20 extends for some distance into the interior of the muffler to the extent of a little more than three cups as hereinafter described.

The interior of the muffler is divided generally into three chambers. The first providing an expansion chamber and comprising the space occupied by the first four cups 1. To this end the bases of the first three cups 1 are equipped in each instance with large central apertures 25. Said apertures are so large that only a narrow rim 26 is left as part of the bases of said cups 1.

The base 27 of the fourth cup 1 is equipped

with small apertures 30 made by punching holes therethrough, whereby conical flanges 31 are formed about said apertures. Flanges 31 extend in the direction of progress of the gases and will aid in disseminating the heat incident thereto. Likewise, the bases 27 of the fifth and sixth cups are punched with small apertures 30 having conical flanges 31. The bases 27 of the fourth, fifth and sixth cups 1, therefore, being provided with said small apertures 30 having conical flanges 31, form the second chamber which tends to break up and segregate the oncoming exhaust gases. From this second chamber, the gases will pass to the third, or last chamber composed of the last four cups 1, through which extends outlet pipe 20. The bases 27 of three of said cups 1 are provided in each instance with a central aperture 32 a little larger than the diameter of pipe 20, whereby said pipe 20 can be projected through said aperture 32 and yet leave a little space between the edge 35 of said apertures 32 and the side of pipe 20 for the passage of exhaust gases. This space will be sufficient to allow part of the exhaust gases to pass therethrough into a dead pocket from which they will rebound and escape eventually through outlet pipe 20. A large part of said exhaust gases, however, progress directly from the second chamber through pipe 20 in an unimpeded manner to the atmosphere.

In operation, the exhaust gases will enter the muffler by way of pipe 14.

On entering, they will have a chance to expand throughout the first chamber composed of the first four cups 1 of the muffler. The gases will progress then to the second chamber composed of the next two cups 1 both of which as well as the base of cup 1 through which the gases enter the second chamber are equipped with small apertures 30 having conical flanges 31. As the gases enter the third chamber, part will progress directly to atmosphere through pipe 20 and part will enter the pocket formed by the last three cups and the wall of pipe 20 from whence they will rebound and eventually escape by way of pipe 20.

It may be advisable to attach entrance pipe 14 at an angle, as shown in Figs. 5 and 6. In order to attach said pipe by spinning to end member 5, an oval shaped aperture is made therein. A bead 40 is formed on pipe 14 at an angle to a horizontal plane by using a tool 41 provided with an open recessed end 42 having the annular wall thereof slit to form fingers 43 adapted to spread under the pressure of a wedge 44. Furthermore, a bead projecting member 45 is attached to each of the fingers 43, in such manner that the series form an annular ring adapted to form a bead as 40.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In a muffler for explosive engines built of a plurality of cups, a chamber for the expansion of the exhaust gases, said chamber being equipped with a plurality of cups having unperforated peripheral flat flanges forming central apertures for the passage of said gases, said flanges being disposed in alignment with each other, whereby the central apertures will provide a substantially unobstructed passage for said gases, and other cups equipped with a plurality of apertures, whereby to break up and segregate the exhaust gases, and means for causing part of said gases to rebound before reaching the atmosphere.

2. In a muffler for explosive engines built of a plurality of cups; a chamber for the expansion of the exhaust gases, said chamber being equipped with a plurality of cups having peripheral flat flanges, said flanges forming central apertures for the passage of said gases, said flanges being disposed in alignment with each other, whereby the central apertures will provide a substantially unobstructed passage for said gases, other cups equipped with a plurality of small apertures, whereby to break up and segregate the exhaust gases and a dead pocket for permitting part of said exhaust gases to rebound before escaping to the atmosphere from second named series of cups.

3. In a muffler for explosive engines built of a plurality of cups, a chamber for the expansion of the exhaust gases, said chamber being equipped with a plurality of cups having unperforated peripheral flat flanges forming central apertures for the passage of said gases, said flanges being disposed in alignment with each other, whereby the central apertures will provide an unobstructed passage for said gases, a second chamber equipped with a plurality of cups having small apertures whereby to break up and segregate the exhaust gases, and a third chamber having a pipe with an unobstructed passage therein projecting into said third chamber, whereby to allow for the passage of part of the exhaust gases directly to the atmosphere.

4. In a muffler for explosive engines built of a plurality of cups, a chamber for the expansion of the exhaust gases, said chamber being equipped with a plurality of cups having peripheral flanges forming central apertures for the passage of said gases, said flanges being disposed in alignment with each other, whereby the central apertures will provide a substantially unobstructed passage for said gases, a second chamber equipped with a plurality of cups having small apertures, whereby to break up and segregate said gases and a third chamber equipped with a plurality of cups and having a pipe extending therein, the cups of said third chamber hav-

ing apertures, whereby to allow part of the exhaust gases to pass to the atmosphere.

5. In a muffler for explosive engines built of a plurality of cups, and end members, a chamber for the expansion of the exhaust gases, said chamber being equipped with a plurality of cups having peripheral flanges forming central apertures for the passage of said gases, said flanges being disposed in alignment with each other, whereby the central apertures will provide a substantially unobstructed passage for said gases, a second chamber equipped with a plurality of cups having small apertures, whereby to break up and segregate the exhaust gases, the third chamber having an outlet pipe extending therein, whereby to permit part of said exhaust gases to reach the atmosphere, said third chamber forming a pocket, whereby to cause the remaining part of said exhaust gases to rebound before reaching the atmosphere and annular beads formed in said outlet pipe, whereby to aid in fastening said pipe to one of said members to form an air tight joint.

In testimony whereof I affix my signature.

HERBERT S. POWELL.