Nov. 5, 1935. J. W. TATTER 2,019,746

MUFFLER

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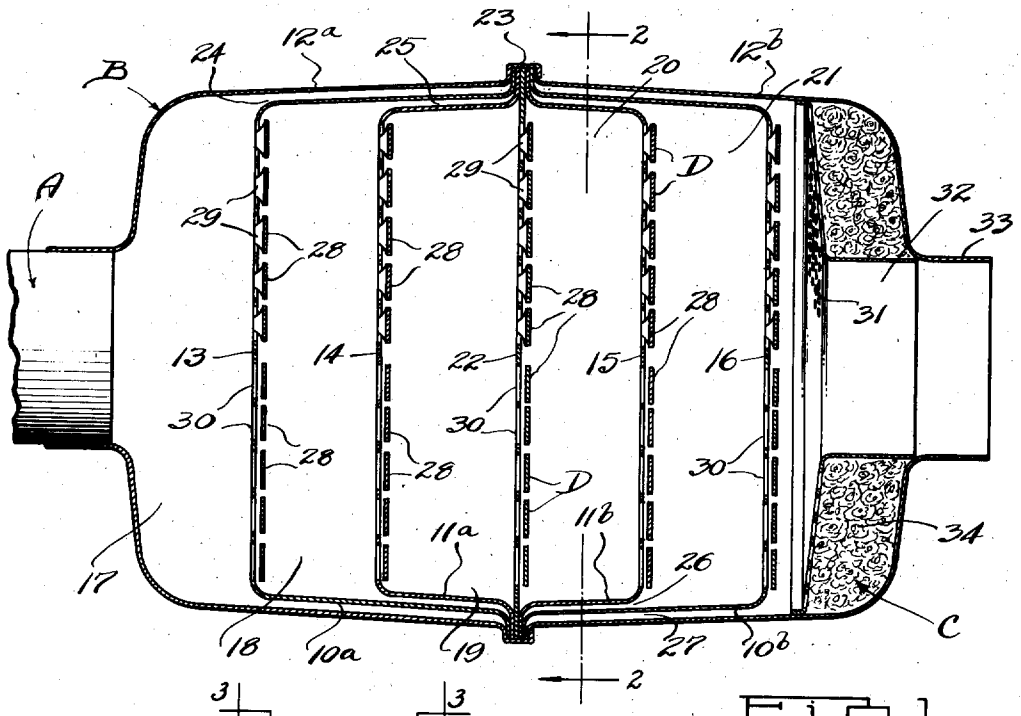

Fig. 1.

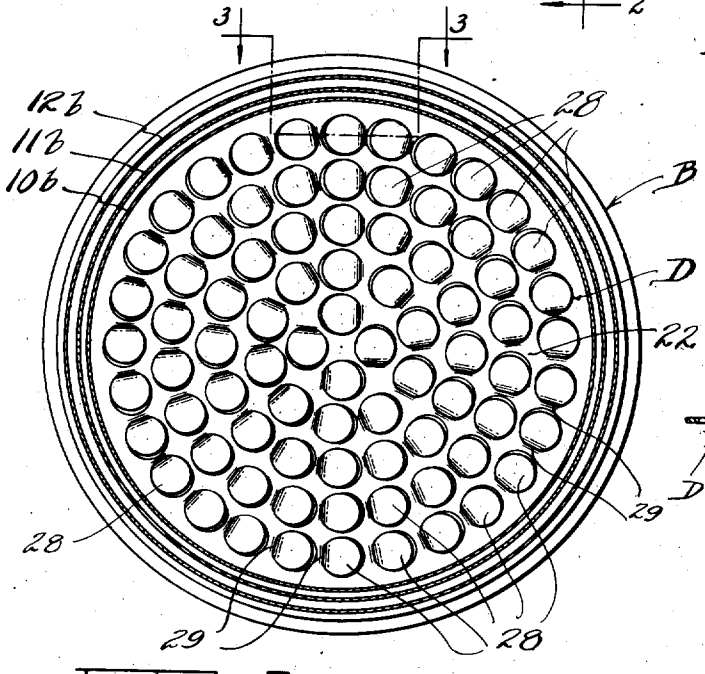

Fig. 2.

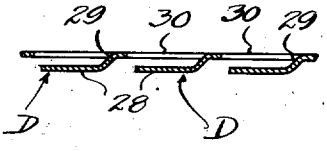

Fig. 3.

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UNITED STATES PATENT OFFICE

2,019,746

MUFFLER

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10 Claims. (Cl. 137—160)

This invention relates to mufflers for use with internal combustion engines.

It is an object of my invention to provide an improved muffler whereby the sound or noises of the exhaust are muffled with very little back pressure on the engine with consequent minimization of power loss.

It is a further object of my invention to provide a muffler which may be manufactured at very low cost, it being exceedingly important in the automotive field in order to successfully market a muffler to combine features of low back pressure and satisfactory muffling characteristics with low manufacturing cost.

Further objects and advantages of my invention will be apparent from the following detailed description of my invention as illustrated in the accompanying drawing in which:

Figure 1 is a longitudinal sectional view through the muffler,

Figure 2 is a sectional view through 2—2 of Figure 1, and

Figure 3 is a detail sectional view through 3—3 of Figure 2.

In the drawing reference character A represents the customary exhaust pipe conducting the exhaust gases from the engine (not shown) and B is the muffler. The muffler preferably is constructed of a plurality of oppositely extending pairs of complementary cup-shaped baffles or partition members 10^a, 10^b and 11^a, 11^b and outer housing members 12^a, 12^b. All of these members are preferably tapered outwardly and inwardly from substantially the longitudinal central transverse plane of the muffler to facilitate the die pressing operation in forming these members.

The end walls or partition walls 13, 14, 15, and 16 of the respective members 10^a, 11^a, 11^b, and 10^b divide the muffler into chambers 17, 18, 19, 20, and 21 there being a central plate or transverse partition member 22 intermediate the walls 14 and 15. One important feature of my invention resides in securing the edges of the cup-shaped partition members 10^a, 10^b, 11^a, 11^b and the plate 22 together around the circumference of the muffler. One way in which this may be conveniently done is to arrange these edges in face contact as shown in Figure 1 with the edge of one of the housing members 12^a extended at 23 for secure crimping around the nested edges of the remaining elements.

The successively nested or telescoped baffle members are preferably spaced at their side walls within each other to provide "dead air" pockets 24, 25, 26, and 27 for assisting in the muffling action and also for spacing these members against rattling or transmission of noise to the housing.

The walls 13, 14, 22, 15, and 16 are provided with a novel means for producing the muffling action with exceedingly low back-pressure effect and at very low cost. Thus these walls are die stamped similarly, each having a series of offset tongues 28 preferably arranged in concentric circles about their axes. I have found that these tongues may be conveniently formed substantially circular with their main body portions D lying substantially in a plane parallel with their respective walls, the body portions being connected with the walls by necks 29 thereby forming a plurality of openings 30 in the walls or baffles. The tongues 28 are preferably offset on the low-pressure side of each of the baffles or on the side thereof opposite to the source of exhaust gas flow. Further, I have discovered that improved muffling qualities result from arranging the tongues 28 circularly opening in one direction as will best be noted from Figure 2 whereby the exhaust gases in the chambers will be given a circular motion about the muffler axis, this turbulence assisting in breaking up the sound waves and it will be noted that the same circular motion is maintained between successive baffles. In other words I prefer to form the tongues of the several baffles with the same general directional effect as I have found this to provide excellent results.

While my muffler as thus far described provides for improvements in the art within the stated objects of my invention I contemplate in some instances as a part of my invention to further break up the sound waves as a further improved muffler action by providing at one end of the muffler, preferably adjacent the outlet 33, a secondary baffling device C consisting of a screen or finely perforated plate 31 across the muffler housing and in the illustration having a flanged centrally located tubular outlet 32, aligned with and preferably having the same size opening as the main outlet 33 of the muffler. In the space or pocket provided between this baffle C and the housing member 12^b I position a quantity of metal wool or chips 34. Thus the sound waves are broken up and dissipated without introducing any material back pressure since the opening 32 does not impose a restriction on the exhaust gases.

By referring to Figure 2 it will be noted that the tongues 28 are located in close proximity to each other whereby a relatively large area of total opening in any wall is provided, this materially minimizing back pressure, while the turbulent

swirling action and successive expansion chambers provide for an improved muffling action.

By reason of my invention I am enabled to obtain improved muffling characteristics including exceptionally low back pressure with a construction substantially one-half to one-third the weight and size of the ordinary mufflers now in general use, such improvements greatly reducing the cost of the muffler.

What I claim as my invention is:

1. In a muffler, a casing, a plurality of spaced walls within the casing, said walls having substantially flat tongues deflected from their respective walls, said tongues of each wall having offset portions lying substantially in a plane parallel with the wall associated therewith.

2. In a muffler, a casing comprising oppositely cupped members, a plurality of substantially cup-shaped elements within the casing and having openings through which the exhaust gas may flow, and common means securing the edges of said baffles and casing members, the side walls of said elements being spaced from the casing members and from each other, said elements and members being constructed to provide substantially dead air spaces for exhaust gases offset from the normal gas flow.

3. A muffler including a casing, a generally cup-shaped member within the casing presenting a perforated wall for exhaust gas passage, said member having non-perforated side walls spaced from and within the casing inner walls whereby to provide chambers offset from the normal gas flow for trapping exhaust gases therein.

4. A muffler including a casing, a series of inner and outer nested cupped elements positioned therein and having openings for exhaust gas passage, the inner elements cooperating with the outer elements to provide chambers offset from the normal gas flow for trapping exhaust gases therein.

5. In a muffler, a casing, a plurality of substantially uniformly spaced parallel walls within the casing, said walls having substantially flat tongues deflected and offset from their respective walls to provide openings, the offset portions of said tongues of each wall lying substantially in a plane parallel with the wall associated therewith and having sufficient clearance with respect to the edge of the opening whereby to provide passages each having an area at least as great as the area of the opening associated therewith.

6. In a muffler, a casing, a plurality of spaced baffle walls disposed within the casing and provided with tongues deflected from said walls whereby to provide openings therethrough, said tongues being offset in substantial parallel relation with said associated walls and substantially aligned with said openings for altering the direction of gas flow and deflecting said flow through an angle of approximately 90 degrees, said tongues arranged for cooperative action on the exhaust gas flow to impart a substantial circular movement to the exhaust gases relative to the longitudinal axis of the muffler.

7. In a muffler, a casing, a plurality of spaced baffle walls disposed within the casing and provided with tongues deflected from said walls whereby to provide openings therethrough, said tongues being offset in substantial parallel relation with said associated walls and substantially aligned with said openings for altering the direction of gas flow and deflecting said flow through an angle of approximately 90 degrees, said tongues having heel portions for connecting the tongues with the wall, said heel portions constructed and cooperating to block the exhaust gas flow in one direction whereby to induce the exhaust gases to flow in a substantial circular movement in the other direction relative to the longitudinal axis of the muffler.

8. In a muffler, a casing, a plurality of spaced walls within the casing, said walls having substantially flat circular tongues deflected from their respective walls whereby to provide substantially circular openings in said walls through which exhaust gas may flow within the casing, said tongues being offset from said walls whereby to substantially overlie said openings but having sufficient clearance with respect to the edge of said openings to provide a passage having a cross-sectional area at least as great as the area of the opening.

9. In a muffler, a casing, a wall extending transversely within the casing and having tongues deflected and offset from one face of the wall whereby to provide openings in said wall through which exhaust gas may flow, said tongues being offset from said walls whereby to substantially overlie said openings but having a clearance with respect to the edge of said openings less than the diameter of the opening but sufficient to provide a passage having a cross-sectional area at least as great as the area of the opening, said tongues being closely spaced substantially over the full face of said wall.

10. In a muffler, a casing, a wall extending transversely within the casing and having tongues deflected and offset from one face of the wall whereby to provide openings in said wall through which exhaust gas may flow, said tongues being offset from said walls whereby to substantially overlie said openings but having sufficient clearance with respect to the edge of said openings to provide a passage having a cross-sectional area at least as great as the area of the opening, said tongues being closely spaced substantially over the full face of said wall and arranged generally in a plurality of concentric circles, said openings and tongues cooperating to impart to said gases a substantially circular movement relative to the longitudinal axis of the muffler.

JOHN W. TATTER.