

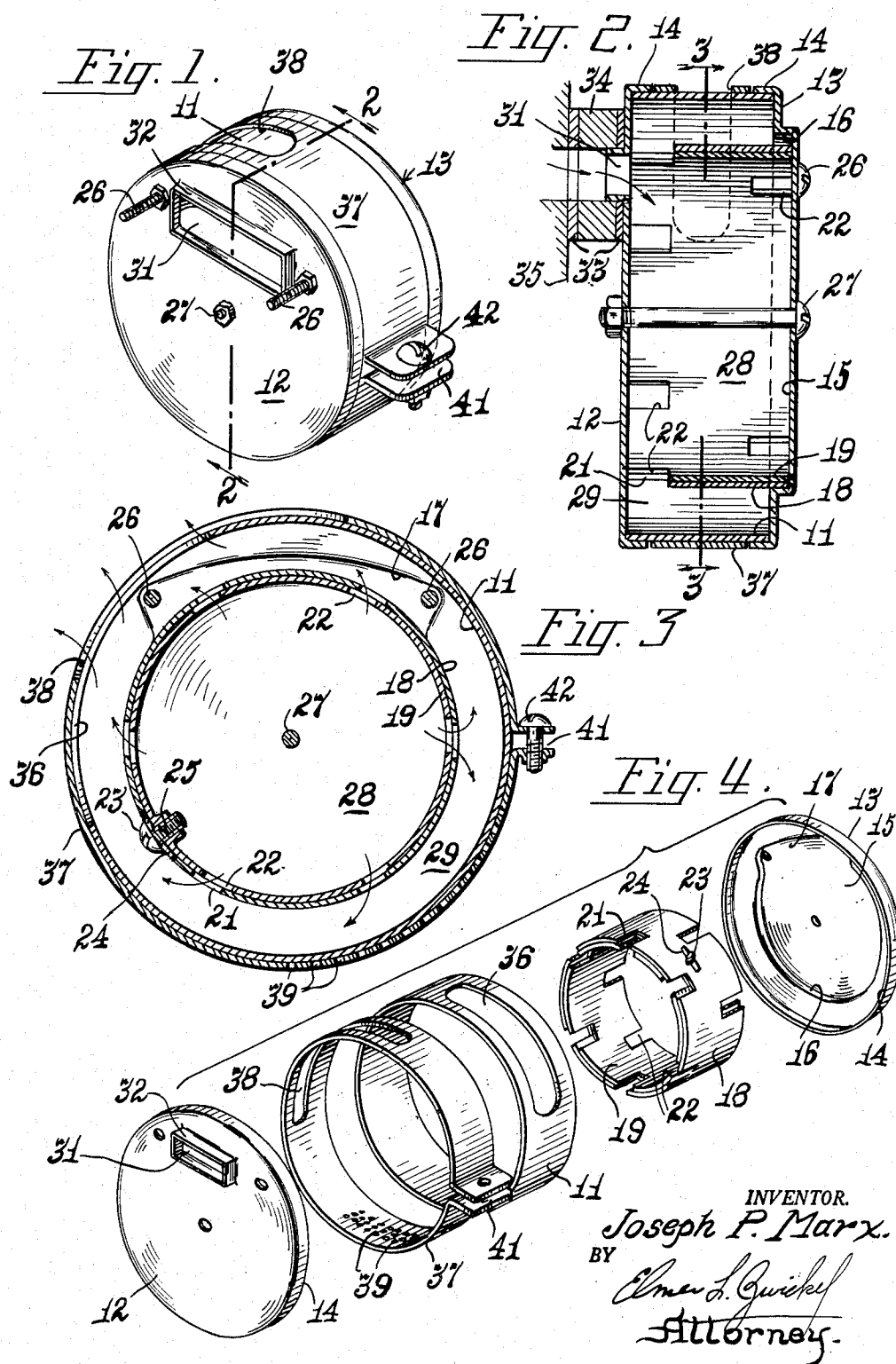
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MUFFLERS

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This invention relates to improvements in silencers and is more particularly concerned with the novel construction and assembly of a muffler especially designed to muffle or otherwise control the noises of the exhaust gases of small internal combustion engines such as those of the type used to power Go-Karts and other devices or vehicles including lawn mowers, and like equipment.

Mufflers of the character to which this invention pertains are necessarily light in weight, compact, inexpensive to construct and assemble, and are adapted to be adjusted prior to or after installation for the purpose of varying the muffling or tone characteristics of the exhaust and to accommodate the back pressure characteristics of the engine on which it is mounted. The structure also includes novel means to locate the exhaust outlet in a pre-selected position.

It is therefore an object of the present invention to provide a novelly constructed muffler.

Another object is to provide a muffler structure that is simple to construct and may be easily disassembled for cleaning.

Another object is to provide a novel muffler assembly, the parts of which may be easily and quickly oriented so as to alter the muffling or tone characteristics thereof.

Another object is to provide a muffler assembly with an exterior exhaust control which may be adjusted easily and quickly and without disassembly of any of the parts thereof.

Another object is to provide a muffler assembly of a kind wherein the exhaust outlet may be adjusted with respect to the inlet opening thereof, so as to afford directional control of the exhaust gases.

With the foregoing and such other objects in view, which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in form, proportion, size and minor details of the structure may be made without departing from the spirit of the invention.

Referring to the drawings in which the same characters of reference are employed to identify corresponding parts:

FIG. 1 is a perspective view of a muffler embodying the invention.

FIG. 2 is a diametrical sectional view, on an enlarged scale taken substantially on line 2—2 of FIG. 1, and illustrating the mounting thereof.

FIG. 3 is a sectional view taken substantially on line 3—3 of FIG. 2.

FIG. 4 is an exploded perspective view of the assembly, showing the parts thereof in detail and on a reduced scale.

Referring to the exemplary disclosure in the accompanying drawings, the muffler includes an outer casing comprised of a cylindrical wall 11 having end caps 12, 13 fitted on opposite faces thereof and each preferably hav-

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ing a peripheral flange 14 to snugly embrace the related outside marginal edges of said body so as to provide a leak proof joint when in final assembled condition.

End wall 13 preferably is formed with an outwardly offset concentric area 15 defining a shoulder 16 on its inside surface and which area may include a segmental enlargement as indicated at 17. Mounted within body 11 and one within and concentric with the other and with said body wall 11 are a pair of inner rings or walls 18 and 19 each having a plurality of circumferentially spaced slots 21—22 respectively, opening onto each edge thereof. The rings or walls 18 and 19 are of such width as to permit one edge thereof to be nested in the concentric offset area 15 and be held in position by abutment of their other edges with the inside surface of end wall 12. Prior to assembly the rings 18—19 are adjusted circumferentially relative to each other to afford total or partial registration of slots 21 with slots 22 and they are held in such position of adjustment by a screw 23 that extends through a limiting slot 24 in the outer one of said rings and is screw threaded into a tapped hole 25 in the inner of said rings. Such relative adjustment of slots 21—22 is for the purpose of controlling the volumetric flow of exhaust gases through said slots, as will be more fully explained hereinafter. The whole is held tightly in assembled condition by tie bolts 26 arranged inwardly of the periphery thereof and by an axial tie bolt 27. As shown, the rings 18—19 define inner and outer chambers 28—29 respectively.

End wall 12 is formed with a rectangular opening 31 the longitudinal axis of which extends between tie bolts 26. Preferably, opening 31 is externally flanged, as at 32, to receive gaskets 33 (FIG. 2) and/or a mounting fitting 34 employed to provide a gas-escape proof fitting over the exhaust outlet of engine block 35. The exhaust gas inlet opening 31 is so related to inner rings 18—19 as to admit exhaust gases flowing therethrough into the interior chamber 28 wherein they expand and are turbulated in a manner to cause initial diffusion of sound waves. The turbulated gases partially deadened sound waves leave said chamber 28 through the openings defined by slots 21—22. Because the area of these openings may be varied upon relative adjustment of rings 18—19, the noises of the exhaust gases flowing therethrough may be further reduced or altered as to tonal quality in proportion to the size of the openings provided. Upon leaving the opening of slots 21—22, the gases and sound waves enter outer chamber 29 where they again expand and are turbulated to effect maximum diffusion of the sound waves and further deadening of exhaust noises.

The now controlled sound waves and exhaust gases leave outer chamber 29 through a circumferentially elongated exhaust opening 36 in the cylindrical wall 11. Means in the form of a circumferential band 37 is clamped over the outside surface of cylindrical wall 11 for further control of sound. As shown, this band has in one portion thereof a circumferentially elongated slot 38 and in another portion thereof, preferably diametrically opposed to slot 38, a plurality of apertures 39. The band is split as at 41 and is secured in a position of circumferential adjustment around wall 11 by a clamp screw 42. When the slot 38 is in total register with wall slot 36 minimum control of exhaust sound leaving chamber 29 is obtained. By adjusting said ring circumferentially relative to wall 11 to reduce the area of the passage

through slots 36—38, increased sound control is effected but such adjustment in a minimal direction is, of course, limited by the back pressure characteristics of the engine on which the muffler is mounted. As an alternative, the band 37 can be positioned with all or some of its apertures 39 in register with exhaust slot 36. There is thus provided a multitude of variable positions which may be assumed by the band 37 for sound control.

It should be noted also that because of the free mounting of cylindrical wall 11 between end caps 12—13, said wall may be rotated, upon loosening tie rods 26—27, relative to said caps so as to position the exhaust outlet 36 in any desired location circumferentially with respect to inlet opening 31. As a result, the direction of exhaust discharge may be pre-selected to adapt the muffler to various types of installations.

The muffler structure is such that it may be easily and quickly disassembled for cleaning or adjustment by the removal of tie bolts 26—27 and said tie bolts 26 may, if desired, be of sufficient length to afford means for securing the muffler on the engine body.

As many possible embodiments may be made in the invention, and as many changes might be made in the embodiments above set forth, it is to be understood that all matters hereinafter set forth or shown in the accompanying drawings are to be interpreted as illustrative and not in a limiting sense.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A muffler comprising a hollow cylindrical body including a cylindrical wall and capping end walls, one of said end walls having a radially offset inlet opening for exhaust gases and sound waves, an inner cylindrical partition bridging said end walls and defining an inner chamber into which exhaust gases and sound waves entering the inlet opening flow and an outer circumferential chamber, said inner cylindrical partition having circumferentially spaced openings therein through which gases and sound waves flow from the inner chamber to the outer circumferential chamber, and the circumferential wall of said body having an exhaust outlet.

2. The muffler recited in claim 1, in which means is provided in the cylindrical partition to vary the effective size of the circumferentially spaced openings therein.

3. The muffler recited in claim 1 in which a band surrounds the cylindrical wall of said cylindrical body and said band has a plurality of openings therein selectively registerable with the exhaust outlet.

4. A muffler comprising a pair of circular end walls and a cylindrical wall extending between said end walls and defining therewith a hollow circular body, a pair of concentric telescoped rings extending between said walls and defining an inner chamber and an outer circumferential chamber, one of said end walls having an inlet opening offset radially outwardly from the axis thereof and through which exhaust gases and sound waves may pass directly into said inner chamber, said telescoped rings having a plurality of circumferentially spaced passages connecting said inner chamber with said outer chamber and through which gases and sound waves in the inner chamber flow into the outer chamber, said telescoped rings each being circumferentially adjustable relative to one another to adjust the effective size of said passages, said outer cylindrical wall having an exhaust opening communicating with the outer circumferential chamber, and said outer cylindrical wall being circumferentially adjustable so as to alter the position of the exhaust opening therein relative to the inlet opening.

5. The muffler recited in claim 4, in which a band embraces said cylindrical wall and has openings therein selectively registerable with the exhaust opening to control the effective size of the exhaust opening, and means is provided in the band to lock said band in a selected position of circumferential adjustment.

6. A muffler comprising a pair of opposed circular end walls, a cylindrical outer wall extending between said circular end walls, a concentric recess on the inside face of one of said end walls, a pair of telescoped inner walls seated at one end in said recess and abutting the inside face of the other end wall, said inner walls defining an inner chamber and an outer circumferential chamber, an externally flanged radially offset inlet opening for exhaust gases in one of said end walls communicating with the said inner chamber, said telescoped walls having registering openings therein through which exhaust gases may pass from the inner chamber into the outer circumferential chamber, said telescoped walls being circumferentially adjustable relative to each other to vary the effective size of the registering openings therein, an exhaust outlet in the cylindrical outer wall, said outer cylindrical wall being circumferentially adjustable to vary the position of its exhaust opening circumferentially relative to the radially offset inlet opening, and bolts extending through the outer chamber and through the end walls for securing the several parts together firmly.

7. A muffler comprising a pair of opposed circular end walls, a cylindrical outer wall extending between said circular end walls, a pair of telescoped inner walls extending between and seated at their ends against the respective end walls, said inner walls defining an inner chamber and an outer circumferential chamber, an externally flanged radially offset inlet opening for exhaust gases in one of said end walls communicating with the inner chamber, said telescoped walls having registering openings therein through which exhaust gases may pass from the inner chamber into the outer circumferential chamber, said telescoped walls being circumferentially adjustable relative to each other to vary the effective size of the registering openings therein, an exhaust outlet in the cylindrical outer wall, said outer cylindrical wall being circumferentially adjustable to vary the position of its exhaust opening circumferentially relative to the radially offset inlet opening, and bolts extending through the outer chamber and through the end walls for securing the several parts together firmly.

8. A muffler comprising a pair of opposed circular end walls, a cylindrical outer wall extending between said circular end walls, a circular recess on the inside face of one of said end walls, a pair of telescoped inner walls seated at one end in said recess and abutting the inside face of the other end wall, said inner walls defining an inner chamber and an outer circumferential chamber, a radially offset inlet opening for exhaust gases in one of said end walls communicating with the said inner chamber, said telescoped walls having registering openings therein through which exhaust gases may pass from the inner chamber into the outer circumferential chamber, said telescoped walls being circumferentially adjustable relative to each other to vary the effective size of the registering openings therein, an exhaust outlet in the cylindrical outer wall, said outer cylindrical wall being circumferentially adjustable to vary the position of its exhaust opening circumferentially relative to the radially offset inlet opening, and bolts extending through the outer chamber and through the end walls for securing the several parts together firmly.

9. A muffler comprising a pair of opposed circular end walls, a cylindrical outer wall extending between said circular end walls, a concentric recess on the inside face of one of said end walls, a pair of telescoped inner cylindrical walls seated at one end in said recess and abutting the inside face of the other end wall, said inner walls defining an inner chamber and an outer circumferential chamber, a radially offset inlet for exhaust gases in one of said end walls communicating with the said inner chamber, said telescoped walls having registering openings therein through which exhaust gases may pass from the inner chamber into the outer circumferential chamber, said telescoped walls being circumferentially adjustable

relative to each other to vary the effective size of the registering openings therein, an exhaust outlet in the cylindrical outer wall, said outer cylindrical wall being circumferentially adjustable to vary the position of its exhaust opening circumferentially relative to the radially offset inlet opening, and means for securing the several parts together firmly.

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