Oct. 24, 1950 R. BECK ET AL 2,527,052

SPARK ARRESTING MUFFLER WITH RETROVERTED FLOW

Filed Jan. 7, 1947 2 Sheets-Sheet 1

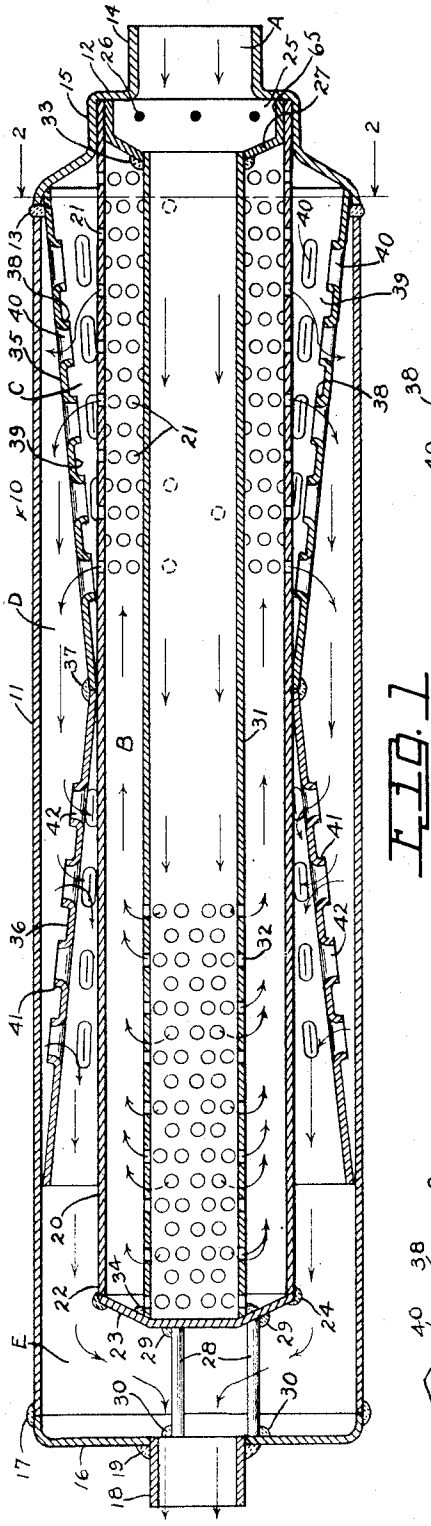


FIG. 1

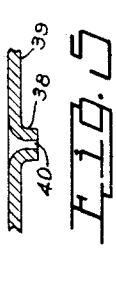


FIG. 5

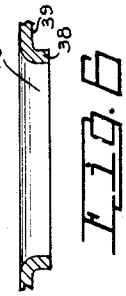


FIG. 6

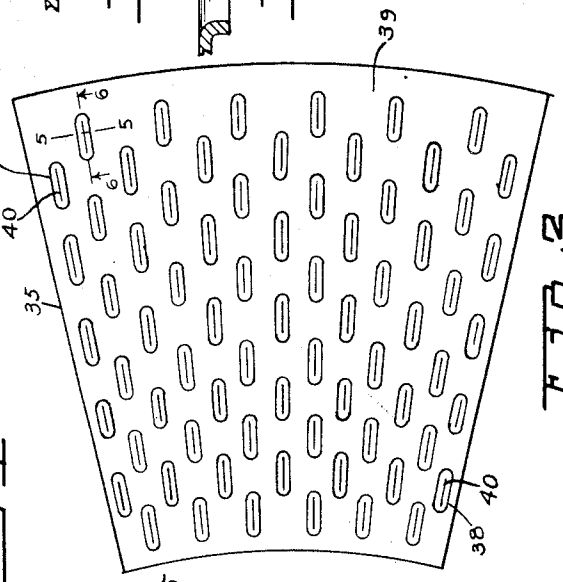


FIG. 3

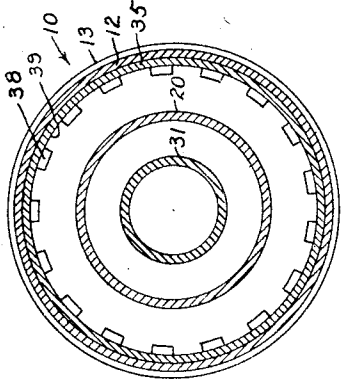


FIG. 2

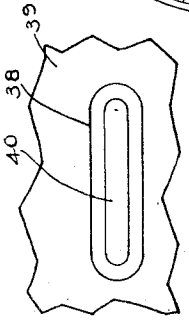


FIG. 4

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SPARK ARRESTING MUFFLER WITH RETROVERTED FLOW

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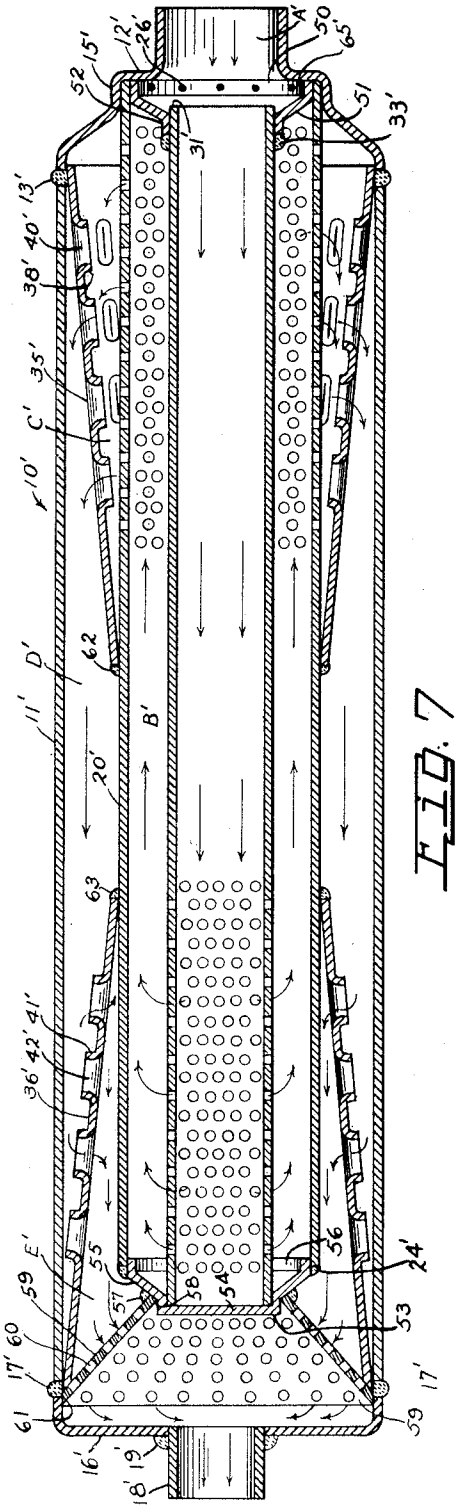


FIG. 7

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SPARK ARRESTING MUFFLER WITH RETROVERTED FLOW

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Application January 7, 1947, Serial No. 720,530

9 Claims. (Cl. 181—53)

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The present invention relates to mufflers and one that will arrest and prevent sparks from exuding from mufflers.

It is an object of the present invention to provide a muffler having means that will disintegrate sparks.

Another object of the present invention is the provision of a muffler having means for angularly deflecting sparks.

A still further object of the present invention is the provision of means for arresting sparks.

A still further object of the present invention is the provision of means enabling flow of sufficient quantity of gases, but preventing back pressure.

A still further object of the present invention is the provision of a muffler that will eliminate fire hazard where gasoline is stored or used.

A still further object of the present invention is the provision of means that dissipates flames in a muffler.

A still further object of the present invention is the provision of means for pocketing raw gasoline that may enter a muffler due to excessive choking of a motor.

These and other objects will be apparent from the following specification when taken in conjunction with the accompanying drawings, in which:

Figure 1, shows a longitudinal sectional view of the present invention.

Figure 2, is a transverse sectional view on line 2—2 of Figure 1 and looking in the direction of the arrows.

Figure 3, is a top plan view of a novel conical baffle with the pierced protrusions.

Figure 4 is a fragmentary enlarged bottom plan view of one of the spark arrestors, the slot being shown exaggerated.

Figure 5, is a fragmentary enlarged vertical section taken on line 5—5 of Figure 3.

Figure 6 is a fragmentary enlarged horizontal sectional view taken on line 6—6 of Figure 3.

Figure 7 is a longitudinal sectional view of a modified form of the present invention.

Referring to the drawings the numeral 10 represents a muffler having a housing or shell 11 and a head 12 that is welded at 13 to the inlet end of the housing. The head 12 is provided with a flange 14 and a recessed portion 15, the flange being adapted for attachment to the exhaust pipe of an internal combustion engine. To the exhaust end of the housing 11 is a head 16 that is secured to the housing by a weld 17.

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Centrally of the head 16 is a pipe or tube 18 that is secured to the head by a weld 19.

Within the housing 11 is a tube 20, a portion of the tube at the inlet end of the muffler being provided with a plurality of apertures 21, the end portion of the tube being impinged between the ring 25 and the recessed portion 15 of the head 12, thus securely anchoring the inlet end of the tube. The end 22 of the tube is closed by a cap 23 that is secured to the tube 20 by a weld 24, the cap serving as an end block for gases and sparks in tubes 20 and 31. The tube 20 at the end 22 is held in spaced relation from the wall of the housing 11 by rods 28, one end of the rods being secured to the cap 23 by welds 29, the opposite end of the rods being secured to the inner face of the cap 16 by welds 30. The ring 25 at its inlet end is of larger diameter than the flange 14 of head 12 and it is secured by spot welds 26. Due to the recessed portion of the head 12 a pocket 65 is formed and this pocket serves as a trap for raw gasoline that may enter the muffler, the trap preventing the raw gasoline from entering and passing into the muffler. Within the tube 20 is a tube 31 that is provided adjacent the outlet end of the muffler with a plurality of apertures 32, and it is to be noted these apertures by being so positioned provide a distance between the apertures 21, thus preventing the gases and sparks that pass through the apertures 32 from directly passing through the apertures 21. The tube 31 is held in spaced relation from the tube 20, and it is secured at the inlet end to the angularly disposed wall 27 of ring 25 by weld 33. The opposite end of tube 31 is secured to the cap 23 by weld 34.

As shown in the drawings, between the inner wall of the housing 11 and the outer wall of the tube 20 there is positioned cone shaped baffles 35 and 36, and these baffles are in opposed relation to each other, baffle 35 being fixedly secured at its large end by weld 13. The smaller end of the coned shaped baffles are fixedly secured by weld 37. The cone shaped baffle 35 is provided with a plurality of protrusions 38 that project downwardly and below the inner wall 39. Each protrusion is provided with a small restricted opening 40. The cone shaped baffle 36 is similarly provided with a plurality of protrusions 41 that are in opposed relation to the protrusions 38 and they extend above the outer wall of baffle 36, each protrusion being provided with a small restricted opening 42.

In the modified form of the invention illus-

trated in Figure 7, the head 12' has a reduced recess portion 15' that receives a ring 50 having a flanged wall 51 and an annular collar 52 that receives the inlet end portion of tube 31', the collar 52 being secured to the tube 31' by weld 33'. The opposite end of tube 31' is covered or closed by the recessed portion 53 of a cap 54 having an angular wall 55 and a ring portion 56, the cap being fixedly secured to the tube 31' by weld 24'. To the angular wall 55 of the cap 54 there is secured by weld 57 the smaller end 58 of a cone 59, the cone being provided with a plurality of openings 60. The larger end 61 of the cone is secured to the body 11' and to the head 16' by weld 17'. Centrally of the head 16' is a pipe or tube 18' that is secured to the head by weld 19'. Between the inner wall of the housing 11' and the outer wall of the tube 20' there are mounted conical baffles 35' and 36' that are in spaced relation and in opposed relation, baffle 35' being secured to the tube 20' at its smaller end by weld 62 and at its larger end by weld 13'. Baffle 36' is secured at its smaller end to the tube 20' by weld 33 and at its larger end by weld 17'. Baffle 35' is provided with a plurality of protrusions 38' each protrusion having a restricted opening 40', and baffle 36' with a plurality of protrusions 41' each having a restricted opening 42', the protrusions 42' being in opposed relation to the protrusions 40'.

In the operation of the form of the invention illustrated in Figure 1, gases and sparks that enter the inlet opening A, and as shown by the arrows, travel through tube 31 until the gases reach the apertures 32 and they are expelled through the apertures 32 and into chamber B, the gases being prevented from passing out of the end of tube 31 by the cap 23. The gases in chamber B travel in the direction indicated by the arrows and when they reach the apertures 21 pass through the apertures into chamber C. Sparks that may be intermingled with and in the flow of gases to this point will not travel directly to the restricted openings 40 in the protrusions 38, but will travel angularly thereto, and in the angular travel will be deflected by the extending portions of the protrusions 38, and any sparks that may be in the gases will be broken up or disintegrated. The gases then pass through the restricted openings 40 from chamber C to chamber D as indicated by the arrows. From chamber D they pass through the narrow or restricted openings 42 in the protrusions 41 into chamber E and any sparks that may have passed through the restricted openings 40 will be further broken or disintegrated by impinging the walls of the protrusions 41. From chamber E the gases and sparks, if any, pass into tube 18 as shown by the arrows and out into space.

In the modified form of the invention the travel of gases and sparks are identical to the travel of gases described in Figure 1, except that at the outlet end where the gases and sparks if any, pass from chamber E' through apertures 60 in cone 59 and out through tube 18' into space.

From the above description it can be seen that sparks and gases must travel through the pierced protrusions and that they are arrested by the pierced protrusions and the very narrow opening. Sparks entering the openings follow an angular course resulting in deflection on sides of interior or neck of the protrusions. Any spark that may clear openings in first baffle are obstructed by similar operation of second baffle. Flames traveling through muffler will burn out before reaching the exhaust end due to the length of travel. Any raw gasoline that may enter muffler through exhaust pipe due to excessive choaking of motor will be pocketed at 65, due to the recess 15 in the head 12.

What is claimed is:

1. An exhaust muffler, comprising a cylindrical casing having an inlet at one end and an outlet at the other, a tubular element in said casing forming said inlet at one end and closed at the other and having a series of perforations in its wall adjacent said other end, a cylindrical element in said casing about said tubular element and annularly spaced from said casing to form an annular space around said tubular element closed at both ends, said cylindrical element having perforations in its wall adjacent the inlet end of said casing, a conical baffle in the annular space between the casing and the cylindrical element converging from the inlet end of said casing to an intermediate portion of said cylindrical element and another conical baffle diverging from said intermediate portion to the outlet end of said casing, each of said conical baffles having perforations stamped therein to form protrusions in an upstream direction relative to the flow of gases therethrough.

2. In a cylindrical exhaust muffler having an inlet at one end and an outlet at the other, means forming a central flow passage in said muffler connected with the inlet at one end and closed at the other, and two annular concentric passages thereabout, the outer one of which is directly connected at one end with said outlet and is closed at the other end, the inner one being closed at both ends and connected by perforations in its walls adjacent said inlet with the outer annular passage, and adjacent said outlet with the central passage, thereby reversing the flow of gases twice before exhausting them through said outlet, said outer annular passage having conical baffles therein converging substantially from the outer periphery of either end thereof to the inner periphery of said outer annular passage at its mid-portion, said baffles having perforations stamped therein so as to form protruding lips around said perforations in the upstream direction relative to the flow of gases therethrough.

3. In a cylindrical exhaust muffler having an inlet at one end and an outlet at the other, means forming a central flow passage in said muffler connected with the inlet at one end and closed at the other, and two annular concentric passages thereabout, the outer one of which is directly connected at one end with said outlet and is closed at the other end, the inner one being closed at both ends and connected by perforations in its walls adjacent said inlet with the outer annular passage, and adjacent said outlet with the central passage, thereby reversing the flow of gases twice before exhausting them through said outlet, said outer annular passage having conical baffles therein converging substantially from the outer periphery of either end thereof to the inner periphery of said outer annular passage at its mid-portion, said baffles having slits stamped therein so as to form protruding lips around said slits in the upstream direction relative to the flow of gases therethrough.

4. In a cylindrical exhaust muffler having an inlet at one end and an outlet at the other, means forming a central flow passage connected with the inlet at one end and closed at the other, and two annular concentric passages thereabout,

the outer one of which is directly connected with said outlet at one end and closed at the other, the inner one being closed at both ends and connected by perforations in its walls adjacent said inlet with the outer annular passage and adjacent said outlet with the central passage, thereby reversing the flow of gases twice before exhausting them through said outlet, said outer annular passage having conical baffles therein converging substantially from the outer periphery of either end thereof to the inner periphery at its mid-portion, said baffles having perforations therein.

5. In a cylindrical exhaust muffler having an inlet at one end and an outlet at the other, means forming a central flow passage connected with the inlet at one end and closed at the other, and two annular concentric passages thereabout, the outer one of which is directly connected with said outlet at one end and closed at the other, the inner one being closed at both ends and connected by perforations in its walls adjacent said inlet with the outer annular passage and adjacent said outlet with the central passage, thereby reversing the flow of gases twice before exhausting them through said outlet, said outer annular passage having conical baffles therein converging substantially from the outer periphery of either end thereof to the inner periphery at its mid-portion, said baffles having slits therein.

6. In a cylindrical exhaust muffler having an inlet at one end and an outlet at the other, means forming a central flow passage connected with the inlet at one end and closed at the other, and two annular concentric passages thereabout, the outer one of which is directly connected with said outlet at one end and closed at the other, the inner one being closed at both ends and connected by perforations in its walls adjacent said inlet with the outer annular passage and adjacent said outlet with the central passage, thereby reversing the flow of gases twice before exhausting them through said outlet, said outer annular passage having a pair of perforated conical baffles therein converging substantially from the outer periphery of either end thereof to the inner periphery at its mid-portion.

7. A cylindrical exhaust muffler casing having two annular spaces and a central tubular space concentrically formed therein, an inlet at one end thereof connected to said central tubular space, an outlet at the other end connected to said outer annular space, said inner annular space being in communication with said central tubular space adjacent said outlet end of said muffler and with said outer annular space adjacent said inlet whereby to form a continuous flow passage lengthwise through all the spaces from said inlet to said outlet, said outer annular space being provided with a pair of conical baffles converging from the outer periphery of either end thereof to the inner periphery of said annular space at its mid-portion, said baffles having perforations stamped therein to form protrusions in the upstream direction relative to the flow of gases therethrough.

8. A cylindrical exhaust muffler casing having two annular spaces and a central tubular space concentrically formed therein, an inlet at one end thereof connected to said central tubular space, an outlet at the other end connected to said outer annular space, said inner annular space being in communication with said central tubular space adjacent said outlet end of said muffler and with said outer annular space adjacent said inlet end whereby to form a continuous flow passage lengthwise through all the spaces from said inlet to said outlet, said outer annular space being provided with a pair of conical baffles converging from the outer wall at either end of said space to the inner wall thereof at substantially the middle thereof, said baffles having perforations stamped therein to form protrusions around said perforations in the upstream direction relative to the flow of gases therethrough.

9. A cylindrical exhaust muffler casing having two annular spaces and a central tubular space concentrically formed therein, an inlet at one end thereof connected to said central tubular space, an outlet at the other end connected to said outer annular space, said inner annular space being in communication with said central tubular space adjacent said outlet end of said muffler and with said outer annular space adjacent said inlet end whereby to form a continuous flow passage lengthwise through all the spaces from said inlet to said outlet, said outer annular space being provided with a pair of conical baffles converging from the outer wall at either end of said space to the inner wall thereof at substantially the middle thereof, said baffles having slits stamped therein to form protrusions around said slits in the upstream direction relative to the flow of gases therethrough.

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