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UNIFLOW EXHAUST MUFFLER

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Fig. 1

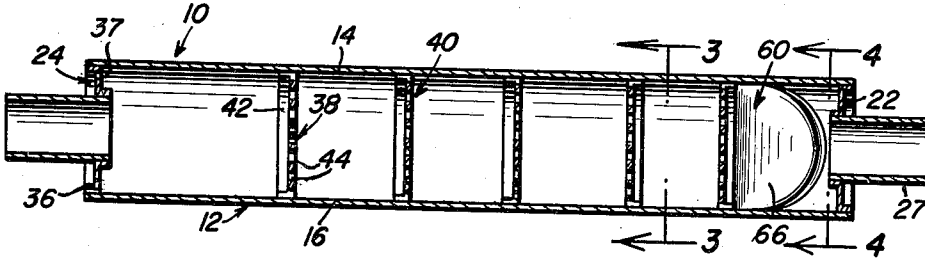


Fig. 2

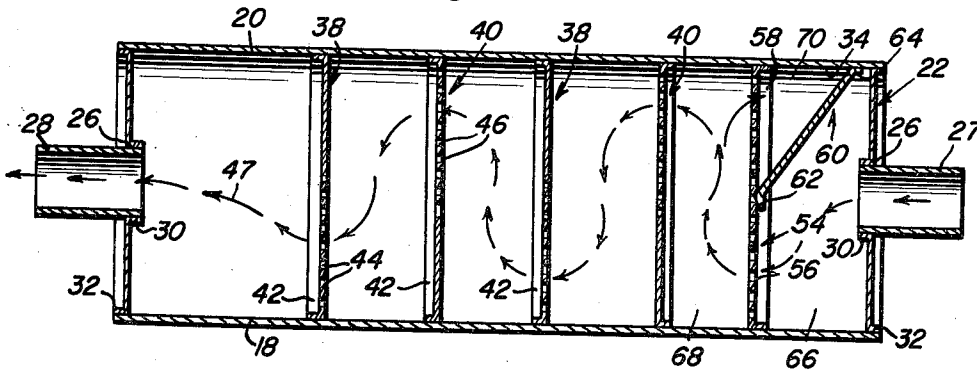


Fig. 3

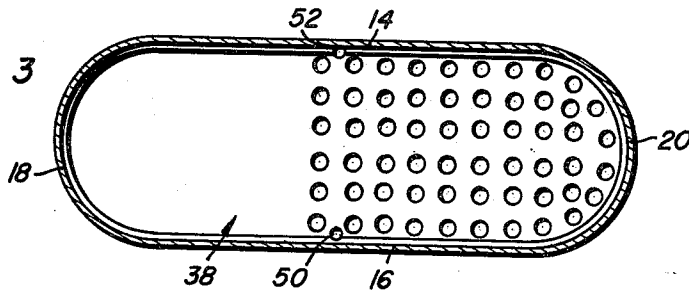
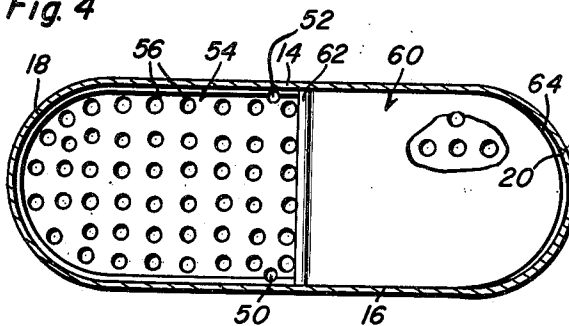


Fig. 4



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UNIFLOW EXHAUST MUFFLER

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This invention relates to a novel and useful uniflow exhaust muffler which is primarily designed to afford an exhaust muffler which will have a long life expectancy and which will effectively muffle the exhaust gases discharged from an internal combustion engine with a minimum amount of back pressure.

The exhaust muffler of the instant invention comprises an elongated tubular member having opposite open inlet and outlet end portions and closure end walls are provided for the inlet and outlet ends of the tubular member which are provided with centrally disposed openings having an outwardly projecting fitting operatively associated therewith and adapted to be secured to a pipe section of an exhaust system. The exhaust muffler is symmetrical in cross section and includes a plurality of transversely extending and longitudinally spaced baffle plates which are secured in the tubular member about substantially their entire periphery to a corresponding inner surface of the tubular member. Each of the baffle plates on one side of the muffler is provided with a plurality of small diameter apertures and the apertured portions of adjacent plates are disposed on opposite sides of the tubular member whereby a reversely curving path extending longitudinally through the tubular member is formed.

A supplemental baffle wall is secured to the inner surfaces of the tubular member adjacent the inlet end thereof and between the inlet end wall and the adjacent baffle plate. The entire cross sectional area of the baffle wall is provided with a plurality of small diameter openings and an impervious baffle panel is secured between the center portion of the baffle wall and one of the side walls of the tubular member a spaced distance from the baffle wall toward the inlet end wall of the tubular member whereby an exhaust gas pulse dampening chamber between the baffle panel and the baffle wall is formed. In this manner, the magnitude of individual pulses of exhaust gases directed into the inlet end of the muffler may be dampened considerably thus enabling the apertured baffle plate to be subjected to a flow of exhaust gases which is more constant in volume than it would be if the exhaust gas pulse dampening chamber were not provided.

The main object of this invention is to provide a uniflow exhaust muffler wherein exhaust gases may be passed through the exhaust muffler while travelling constantly in the same general direction as without reversing direction whereby the back pressure of the muffler may be maintained at a minimum.

A further object of this invention is to provide a uniflow exhaust muffler which will greatly reduce the pulsating of exhaust gases passing through the muffler.

A still further object of this invention is to provide a uniflow exhaust muffler which effectively uses a plurality of generally panel-like baffle members for muffling exhaust gases without creating excessive back pressure.

A final object to be specifically enumerated herein is to provide a uniflow exhaust muffler which will conform to conventional forms of manufacture, be of simple construction and easy to install so as to provide a device that will be economically feasible, long lasting and relatively trouble free to use as a replacement muffler.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter

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described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a longitudinal sectional view of the exhaust muffler taken substantially upon a vertical plane passing through the longitudinal center line of the muffler;

FIGURE 2 is a horizontal longitudinal sectional view of the muffler taken substantially upon the plane passing through the longitudinal center line thereof;

FIGURE 3 is an enlarged fragmentary vertical transverse sectional view taken substantially upon the plane indicated by section line 3-3 of FIGURE 1;

FIGURE 4 is a fragmentary transverse vertical sectional view taken substantially upon the plane indicated by section line 4-4 of FIGURE 1 and on somewhat of an enlarged scale with parts thereof being broken away.

Referring now more specifically to the drawings, the numeral 10 generally designates the uniflow exhaust muffler of the instant invention. The muffler 10 comprises an elongated tubular member generally referred to by reference numeral 12 having upper and lower walls 14 and 16 which are interconnected by means of opposite side longitudinally extending walls 18 and 20. It will be noted from FIGURES 3 and 4 of the drawings that the upper and lower walls 14 and 16 are substantially flat and that the opposite side walls 18 and 20 are transversely curved. Accordingly, it may be seen that the tubular member is generally oval in cross sectional shape.

An inlet end wall generally referred to by reference numeral 22 is provided and is secured in the inlet end of the tubular member 12 while an outlet end wall 24 is provided and is secured in the outlet end of the tubular member 12.

It will be noted that the end walls 22 and 24 each include centrally disposed openings 26 in which cylindrical inlet and outlet fittings 27 and 28 respectively are secured.

It will be noted that the end walls 22 and 24 are provided with inwardly and laterally directed cylindrical flange portions 30 which define the opening 26 and the inner surfaces of the cylindrical flanges 30 are secured to the outer surfaces of the inner ends of the fittings 27 and 28 in any convenient manner such as by welding. In addition, it will be noted that the outer peripheral edges of the end walls 22 and 24 are provided with laterally outwardly directed cylindrical flange portions 32 and it will be noted that the outer surfaces of these flange portions 32 are disposed in surface-to-surface contacting relation with the corresponding portions of the inner surface 34 and the cylindrical member 12 and are secured thereto in any convenient manner such as by welding.

With attention now directed to FIGURE 1 of the drawings it will be noted that a small diameter aperture 36 is provided in the lower end of the outlet end wall 24 and that an additional small diameter aperture 37 is provided in the upper portion of the outlet end wall 24. The apertures 36 and 37 are disposed closely adjacent the upper and lower walls 14 and 16 and are utilized to drain condensation from the interior of the cylindrical member 12.

With attention now directed to FIGURES 2 through 4, it will be seen that the inlet and outlet openings 26 are aligned with the longitudinal center line of the tubular member 12 and that a plurality of transversely extending and longitudinally spaced baffle plates generally referred to by the reference numerals 38 and 40 are disposed within the tubular member 12. Each of the baffle plates 38 and 40 is provided with an outer peripheral laterally directed cylindrical flange portion 42 which has its outer surface disposed in surface-to-surface con-

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tacting relation with the inner surface 34 of the tubular member 12 and it will be noted that these flanges 42 are secured to the cylindrical member 12 in any convenient manner such as by welding.

With attention now directed to FIGURE 2 of the drawings it will be noted that one side of the baffle plates 38 is provided with a plurality of apertures 44 and that the other side of the baffle plates 40 are provided with a plurality of small diameter apertures 46. The total cross sectional area of the apertures 44 formed in each baffle plate 38 approximately equals the total area of the apertures 46 formed in each baffle plate 40 and inasmuch as the small diameter apertures 44 and 46 are disposed on opposite sides of the cylindrical member 12, it will be seen that a reversely curving path extends longitudinally through the tubular member 12 as can best be seen by the arrows 47 in FIGURE 2 of the drawings.

In addition, from FIGURES 3 and 4 of the drawings it will be noted that each of the baffle plates 38 and 40 is provided with a small water passage bore 50 adjacent the lower wall 16 and a small diameter water passage bore 52 adjacent the upper wall 14. Accordingly, condensed water collecting in the tubular member 12 may readily pass from each of the areas defined between adjacent baffle plates rearwardly to the outlet end wall 24 and out of the water outlet openings or apertures 36 formed therein.

With attention now directed to FIGURES 1 and 2 of the drawings it will be seen that a supplemental baffle wall generally referred to by the reference numeral 54 is provided and that the baffle wall 54 is similar to the baffle plates 38 and 40 with the only exception being that the baffle wall 54 is provided with a plurality of openings 56 throughout substantially its entire plan area. The baffle wall 54 includes a laterally directed cylindrical mounting flange portion 58 by which it is secured to the end surfaces of the cylindrical member 12 a spaced distance between the outlet end wall 22 and the adjacent baffle plate 40.

It will be seen that a baffle panel which is impervious and generally designated by the reference numeral 60 is also provided and that it has one edge portion 62 defined by a laterally directed tab secured to the center of the baffle wall 54 while the remote edge portion 64 is secured to the side wall 20 and forms a tab similar to tab 62.

In operation, as the exhaust gases enter the inlet fitting 27 they are received in the first chamber 66 defined between the baffle wall and the inlet end wall 22. Then, the exhaust gases pass through the apertures 56 and enter into the second chamber 68 between the baffle wall 58 and the adjacent baffle plate 40. As the exhaust gases move through the second chamber 68 toward the side 20 of the muffler 10, they have a tendency to swirl through the apertures 56 formed in the baffle wall 54 and behind the baffle panel 60. The area defined between the confronting surfaces of the baffle panel 60, the side wall 20 and the baffle wall 54 defines an exhaust gas dampening chamber as well as a circular path exhaust gas breaker 70. While the chamber 70 is provided for dampening the pulsating exhaust gases entering the muffler 10 in order that the gases may pass through all of the baffle plates 38 and 40 at a somewhat steady rate, if the baffle panel 60 were not provided there would be a tendency for the exhaust gases to circle and recirculate through the side of the baffle wall 54 adjacent the side wall 18.

It will be noted that the muffler 10 may be readily disposed as viewed in FIGURE 1 or that the muffler 10 may be inverted without interfering with the operation of the muffler nor interfering with the drainage of condensed water therefrom.

In addition, it will be noted that the exhaust muffler 10 is constructed of a plurality of types of tubular members and panel-like members and it may therefore be

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appreciated that the exhaust muffler 10 may be constructed at a relatively low cost.

Inasmuch as the total internal cross sectional area of the openings in each of the respective baffle plates 38 and 40 is generally the same and the total cross sectional area of the apertures 56 formed in the baffle wall 54 equals about twice the total area of the apertures formed in any one of the baffle plates 38 and 40, it may be readily seen that the dampening chamber 70 will allow for dampening of the pulsating exhaust gases entering the exhaust muffler 10.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An exhaust muffler comprising an elongated tubular member having opposite open inlet and outlet end portions, inlet and outlet closure end walls secured to the inlet and outlet ends of said tubular member respectively and each end wall including an opening having an outwardly projecting fitting operatively associated therewith adapted to be secured to a pipe section of an exhaust system, said inlet and outlet openings being aligned with the longitudinal center line of said tubular member, transversely extending and longitudinally spaced baffle plates secured in said tubular member and each secured about substantially its entire periphery to the corresponding inner surfaces of said tubular member, said tubular member including upper and lower walls interconnected by means of opposite side walls, said baffle plates each on one side of said tubular member being provided with a plurality of small diameter apertures, the apertured portions of said adjacent plates being disposed on opposite sides of said tubular member whereby a reversely curving path extending longitudinally through said tubular member is formed, the accumulated total area of the apertures in each plate being substantially equal to the total area of the apertures in the other plates, each of said plates having water passage bores formed therein adjacent said upper and lower walls, said outlet end wall including water outlet openings, disposed adjacent said upper and lower walls and communicated with the interior of said tubular member, a supplemental baffle wall secured to the inner surfaces of said tubular member and extending between said upper and lower walls and said opposite side walls and disposed between said inlet end wall and the adjacent baffle plate, said baffle wall having a plurality of small diameter openings formed therethrough throughout substantially its entire plan area and equal in total area to generally twice the total area of the apertures formed in each of said plates, an impervious baffle panel secured between the center portion of said baffle wall, the upper and lower walls of said tubular member and one of said side walls a spaced distance from said baffle wall toward said inlet end wall defining an exhaust gas pulse dampening chamber between said baffle panel and said baffle wall and a circular path exhaust gas breaker for insuring that exhaust gases passing through said baffle panel will not be recirculated.

2. The combination of claim 1 wherein said tubular member is generally oval in cross section and said upper and lower walls are generally flat and said opposite side walls are transversely curved.

3. The combination of claim 1 wherein said baffle plates each include a laterally directed continuous peripheral mounting flange whose outer surface is disposed in surface to surface contacting relation with and secured to the corresponding inner surfaces of said tubular member.

4. An exhaust muffler comprising an elongated tubular member having opposite open inlet and outlet end por-

tions, inlet and outlet closure end walls secured to the inlet and outlet ends of said tubular member respectively and each end wall including an opening having an outwardly projecting fitting operatively associated therewith adapted to be secured to a pipe section of an exhaust system, said inlet and outlet openings being aligned with the longitudinal center line of said tubular member, transversely extending and longitudinally spaced baffle plates secured in said tubular member and each secured about substantially its entire periphery to the corresponding inner surfaces of said tubular member, said tubular member including upper and lower walls interconnected by means of opposite side walls, said baffle plates each on one side of said tubular member being provided with a plurality of small diameter apertures, the apertured portions of said adjacent plates being disposed on opposite sides of said tubular member whereby a reversely curving path extending longitudinally through said tubular member is formed, the accumulated total area of the apertures in each plate being substantially equal to the total area of the apertures in the other plates, each of said plates having water passage bores formed therein adjacent said upper and lower walls, said outlet end wall including water outlet openings, disposed adjacent said upper and lower walls and communicated with the interior of said tubular member, said tubular member being generally oval in cross section and said upper and lower walls being generally flat and said opposite side walls being transversely curved, a supplemental baffle wall secured to the inner surfaces of said tubular member and extending between said upper and lower walls and said opposite side walls and disposed between said inlet end wall and the adjacent baffle plate, said baffle wall having a plurality of small diameter openings formed therethrough throughout substantially its entire plan area and equal in total area to generally twice the total area of the apertures formed in each of said plates, an impervious baffle panel secured between the center portion of said baffle wall, the upper and lower walls of said tubular member and one of said side walls a spaced distance from said baffle wall toward said inlet end wall defining an exhaust gas pulse dampening chamber between said baffle panel and said baffle wall and a circular path exhaust gas breaker for insuring that exhaust gases passing through said baffle panel will not be recirculated.

5. The combination of claim 4 wherein said baffle plates each include a laterally directed continuous peripheral mounting flange whose outer surface is disposed in surface to surface contacting relation with and secured to the corresponding inner surfaces of said tubular member.

6. An exhaust muffler comprising an elongated tubular member having opposite open inlet and outlet end portions, inlet and outlet closure end walls secured to the inlet and outlet ends of said tubular member respectively and each end wall including an opening having an outwardly projecting fitting operatively associated therewith adapted to be secured to a pipe section of an exhaust system, said inlet and outlet openings being aligned with the longitudinal center line of said tubular member, transversely extending and longitudinally spaced baffle plates secured in said tubular member and each secured about substantially its entire periphery to the corresponding inner surfaces of said tubular member, said tubular member including upper and lower walls interconnected by means of opposite side walls, said baffle plates each on one side of said tubular member being provided with a plurality of small diameter apertures, the apertured portions of said

adjacent plates being disposed on opposite sides of said tubular member whereby a reversely curving path extending longitudinally through said tubular member is formed, the accumulated total area of the apertures in each plate being substantially equal to the total area of the apertures in the other plates, a supplemental baffle wall secured to the inner surfaces of said tubular member and extending between said upper and lower walls and said opposite side walls and disposed between said inlet end wall and the adjacent baffle plate, said baffle wall having a plurality of small diameter openings formed therethrough throughout substantially its entire plan area and equal in total area to generally twice the total area of the apertures formed in each of said plates, an impervious baffle panel secured between the center portion of said baffle wall, the upper and lower walls of said tubular member and one of said side walls a spaced distance from said baffle wall toward said inlet end wall defining an exhaust gas pulse dampening chamber between said baffle and said baffle wall and a circular path exhaust gas breaker for insuring that exhaust gases passing through said baffle panel will not be recirculated.

7. An exhaust muffler comprising an elongated tubular member having opposite open inlet and outlet end portions, inlet and outlet closure end walls secured to the inlet and outlet ends of said tubular member respectively and each end wall including an opening having an outwardly projecting fitting operatively associated therewith adapted to be secured to a pipe section of an exhaust system, transversely extending and longitudinally spaced baffle plates secured in said tubular member and each secured about substantially its entire periphery to the corresponding inner surfaces of said tubular member, said tubular member including upper and lower walls interconnected by means of opposite side walls, said baffle plates each on one side of said tubular member being provided with a plurality of small diameter apertures, the apertured portions of said adjacent plates being disposed on opposite sides of said tubular member whereby a reversely curving path extending longitudinally through said tubular member is formed, a supplemental baffle wall secured to the inner surfaces of said tubular member and extending between said upper and lower walls and said opposite side walls and disposed between said inlet end wall and the adjacent baffle plate, an impervious baffle panel secured between the center portion of said baffle wall, the upper and lower walls of said tubular member and one of said side walls a spaced distance from said baffle wall toward said inlet end wall defining an exhaust gas pulse dampening chamber between said baffle panel and said baffle wall and a circular path exhaust gas breaker for insuring the exhaust gases passing through said baffle panel will not be recirculated.

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