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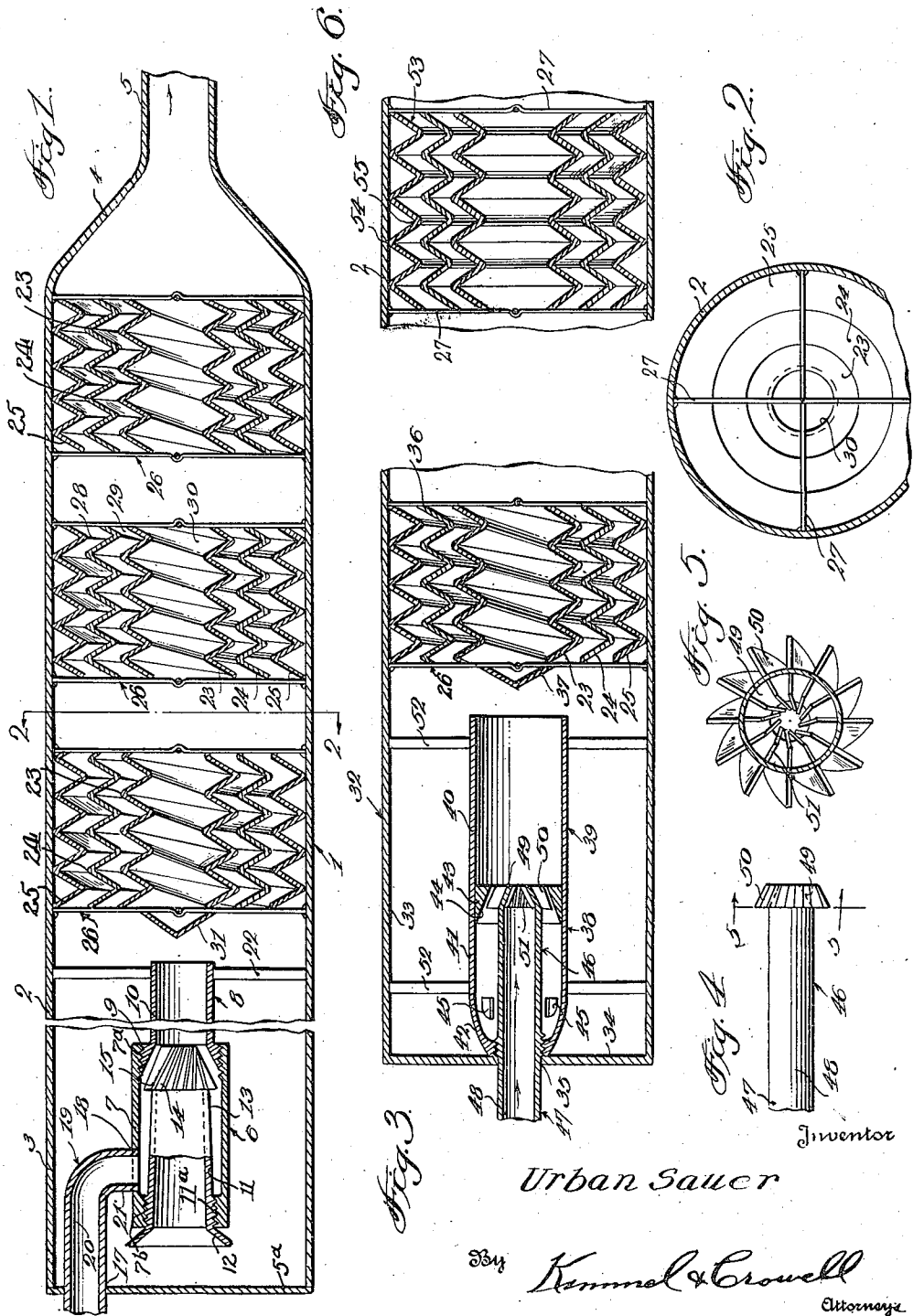
U. SAUER

2,216,653

SUCTION MUFFLER

Filed July 27, 1939

2 Sheets-Sheet 1



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SUCTION MUFFLER

Filed July 27, 1939

2 Sheets-Sheet 2

Fig 7.

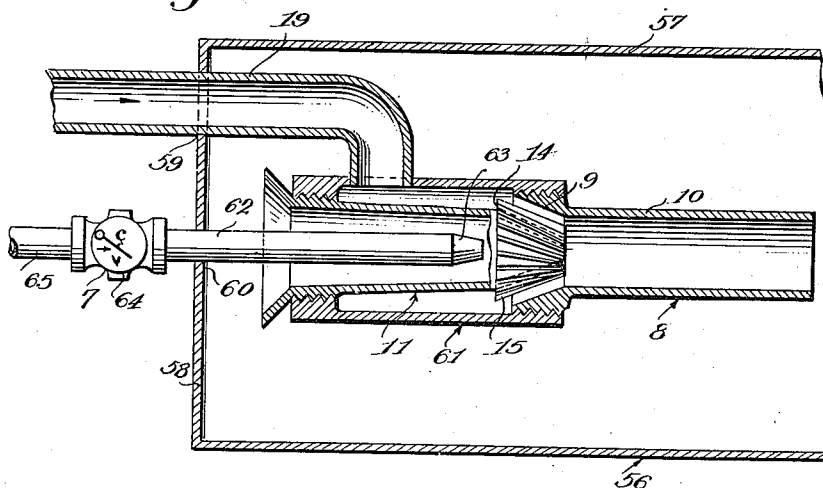


Fig 8.

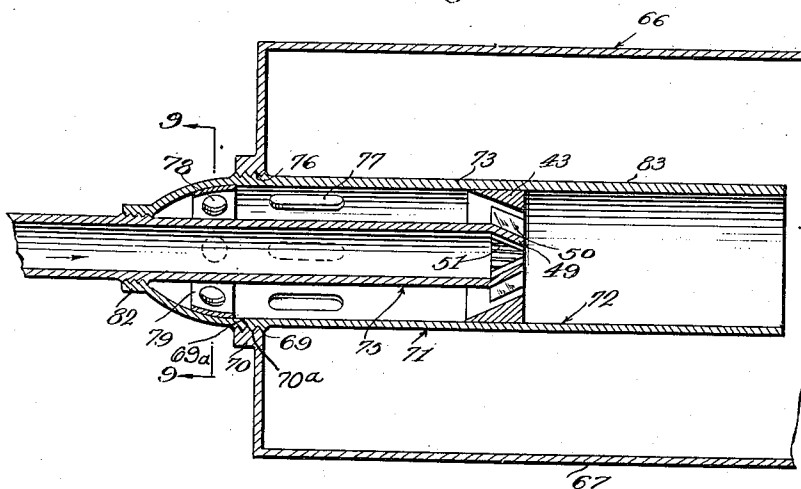
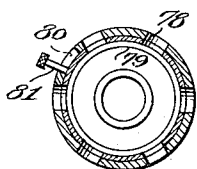


Fig 9.



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UNITED STATES PATENT OFFICE

2,216,653

SUCTION MUFFLER

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20 Claims. (Cl. 181—51)

This invention relates to a suction muffler for internal combustion engines.

The invention aims to provide, in a manner as hereinafter set forth, a muffler of the class referred to for respectively creating a suction in the exhaust line of the engine to facilitate the scavenging of the burned gases; muffling and silencing the exhaust noises; eliminating back pressure in the exhaust line and muffler; aiding in cooling the exhaust line side of the engine; aiding elimination of carbon deposits; reducing the consumption of fuel by the elimination of back pressure; obtaining increased power by the elimination of the adulteration of the incoming charges of fuel by mixing with burnt gases; increasing the acceleration of the engine due to lessened resistances of gases in the exhaust line and muffler; and materially reducing the discharge of obnoxious smoke from the tail pipe.

The invention further aims to provide, in a manner as hereinafter set forth, a suction muffler for the purpose referred to which is simple in its construction, strong, durable, compact, readily installed with respect to the exhaust of an internal combustion engine, thoroughly efficient in its use and comparatively inexpensive to manufacture.

Embodying the aims aforesaid and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts to be more specifically referred to and illustrated in the accompanying drawings wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings—

Figure 1 is a longitudinal sectional view of a suction muffler in accordance with the invention,

Figure 2 is a section on line 2—2 Figure 1,

Figure 3 is a fragmentary view in longitudinal section of a modified form of suction muffler in accordance with the invention,

Figure 4 is a side elevation of the intake member of the injector forming an element of the structure shown by Figure 3,

Figure 5 is a section on line 5—5 Figure 4 upon an enlarged scale,

Figure 6 is a fragmentary view in longitudinal section of still another modified form,

Figure 7 is a fragmentary view in longitudinal section of another modified form of suction muffler in accordance with this invention,

Figure 8 is a fragmentary view in longitudinal

section of still another modified form of suction muffler in accordance with this invention, and

Figure 9 is a section on line 9—9 Figure 8.

With reference to Figures 1 and 2 the muffler 1 includes a housing or casing 2 formed of a cylindrical rear portion 3, a tapered intermediate portion 4 and a reduced cylindrical forward portion 5 which constitutes the tail pipe or outlet for housing 2. The latter is provided with a closure 5^a at its rear end.

Suspended within the rear part of, spaced from and disposed lengthwise with respect to housing portion 3 is an ejector structure 6 which is adapted to be connected to the exhaust line or outlet (not shown) of the engine. The structure 6 acts to conduct the exhaust from the engine into the muffler 1. The structure 6 includes a sleeve 7 open at each end and disposed axially and lengthwise of housing portion 3. The inner face of sleeve 7 at its forward and rear end terminal portions is threaded, as at 7^a, 7^b respectively. Extending into and threadedly engaging with the threads at the forward end terminal portion of the sleeve 7 is a cylindrical nozzle element 8. The latter is formed of a base or rear portion 9 and a forward discharging portion 10. The portion 9 is of greater outer diameter than the portion 10 and is formed with threads on its outer periphery for engagement with the forward threads of sleeve 7 whereby the nozzle 8 is connected to and extends forwardly from sleeve 7. The inner face of portion 9 is tapered from its rear to its forward end. The said portion 10 is of greater length than the said portion 9. Threadedly engaging with the threads on the rear end terminal portion of the inner face of sleeve 7 and extended rearwardly from the latter is a tubular director element 11 for the exhaust gases and which includes a tapered rear end portion 12, a tapered intermediate portion 13 and a tapered forward end portion 14. The portion 12 has its diameter greater than the diameter of the portion 13. The portion 14 has its diameters less than the diameters of the portion 12, 13. The portions 12, 14 are of less length than the length of portion 13. The portion 12 extends outwardly from the rear end of sleeve 7. The portion 14 is arranged to oppose in spaced relation the inner face of the base portion of the nozzle 8. The outer periphery of the portion 14 of the element 11 is formed throughout with spaced inclined deflecting blades or vanes 15 of any suitable form disposed spirally of the said periphery. The inner face of the portion 14 is formed throughout with spaced inclined deflecting blades or vanes, 55

- not shown, of any suitable form disposed spirally of such face, but preferably these vanes on the inner face of said portion 16 will be of the same form and arrangement as the vanes or blades 51, Figure 5. The portion 13 of the element 11 is formed with peripheral threads 11^a which engage with the rear threads 7^b of sleeve 7 whereby the element 10 is connected to sleeve 7. The latter and element 10 are arranged axially.
- 10 The closure 5^a is formed with an eccentrically disposed opening 17. The sleeve 7 between its transverse median and rear end is provided with an opening 18. The ejector structure 6 includes an angle shaped intake pipe 19 for the exhaust gases and which is for communication with the exhaust line or exhaust of the engine. The pipe 19 includes a pair of legs 20, 21 disposed at right angles to each other. The leg 20 extends through and is fixed to the wall of opening 17. The free end of leg 21 is fixed to the wall of opening 18. A support 22 for the nozzle element 8 is arranged in housing portion 3. The pipe 19 in connection with the support 22 suspends the sleeve 7 within and axially of the housing portion 3.
- 25 The muffler 1 includes a plurality of spaced aligned sets of coaxially arranged annular baffles of spiral form. Each set consists of an inner baffle 23, an intermediate baffle 24 and an outer baffle 25. The baffles of each set are arranged in spaced relation. As shown by way of example three sets of baffles are employed, but it is to be understood that the number of sets of baffles may be increased or decreased. The sets of baffles are secured within housing portion 3 forwardly of the nozzle element 8. The outer baffle of each set is suitably secured to the inner face of housing portion 3. Each set of baffles has associated therewith a pair of combined supporting and spacing members 26 consisting of a pair of rods 27 disposed in right angular relation and crossing each other at and secured together at their centers. The pair of supporting and spacing members for each set are arranged in abutting relation with the ends of the baffles of the set. The members 26 are secured, by spot welding to the inner face of housing portion 3 and also to the opposite end of the baffles and maintain these latter in spaced relation.
- 40 The intermediate baffle of each set coacts with the outer and inner baffles of the set to form the spiral channels 28, 29 of annular cross section. The inner baffle of each set provides an axially arranged spiral passage 30 of cylindrical form in cross section and of a width materially greater than the channel 28 or 29. The channels of one set align with the channels of an adjacent set. The passage of one set aligns with the passage of an adjacent set.
- 50 Secured to the combined supporting and spacing member 26 at the rear end of the rearmost set of baffles is a rearwardly extending conoidal-shaped deflector 31. The base of the latter is anchored to the rods or bars 27 of such member 26 at equi-distant spaced points from the centers of the said bars 27. The diameter of the base of the deflector 31 is less than the diameter of the passage 30 of the rearmost set of baffles and such deflector closes a portion of the intake end of such passage.
- 60 The modified form of muffler shown by Figures 3, 4 and 5 and indicated at 32 and its housing or casing 33 is of the same form as the housing 2 with this exception, that the closure 34 for the rear end of housing 33 is formed with an axially arranged opening 35 in lieu of the eccentrically disposed opening 17 formed in the closure 5^a. The muffler 32 will include spaced sets of baffles 36 of the same arrangement and construction as the sets of baffles employed in the muffler 1. The muffler 32 will also include a deflector 37 of the same form and arrangement as the deflector 31. The main difference between the muffler 32 and the muffler 1 resides in the construction of the ejector structure 38 forming an element of the muffler 32.
- 10 The ejector structure 38 includes a nozzle element 39 formed of a forward portion 40 of uniform diameter, an intermediate portion 41 of uniform diameter and a substantially semi-ovoidal shaped rear portion 42. The element 39 is open at each end. Secured to the inner face of the portion 41 at the forward end portion thereof is a collar 43 having a tapered inner face 44. The forward end of the portion 42 is formed circumferentially thereof with spaced ports 45. The rear end of portion 42 is enlarged and threaded.
- 25 The ejector structure 38 includes a tubular exhaust gas director element 46 which is integral with the forward end of an intake pipe 47 which conducts the exhaust gas to the element 46. The pipe 47 leads from the exhaust line or exhaust, not shown of the engine. The pipe 47 has its forward end arranged in and secured to the wall of opening 35. The element 46 merges into the pipe 47 at the opening 35. The element 46 is arranged within and disposed axially of the portions 41, 42 of the element 39, and it is formed with peripheral threads for engaging with the threads on the rear end of nozzle portion 42 connecting the elements 37 and 46 together. The element 46 is formed of a rear portion 48 of uniform diameter and a tapered forward portion 49 of less length than portion 48 and the collar 43. The portion 49 opposes in spaced relation the inner face 44 of collar 43. The forward end of portion 49 is flush with the forward end of collar 43. The outer face of portion 49 is provided throughout with spaced blades or vanes 50 of any suitable form disposed spirally with respect to such face. The inner face of said portion 49 is provided throughout with spaced blades or vanes 51 of any suitable form disposed spirally with respect to such inner face.
- 40 The nozzle element 38 is suspended axially of and within the rear portion 33 of the housing 32 by a pair of spaced parallel supports 52 through the center of which the element 38 extends. The supports 52 and element 32 are suitably secured together by spot welding.
- 55 With reference to Figure 6, the modification relates solely to the form of the baffles 53 of the sets of baffles shown by Figure 6. In lieu of setting up the baffles 53 of spiral form, such as the baffles 23, 24, 25, each of the baffles 53 is corrugated throughout to form annular oppositely disposed V-parts 54, 55 of circular form merging into each other. The baffles 53 of a set will be arranged in the same manner as the baffles 23, 24 and 25 of a set.
- 60 The arrangement of the baffles of a set provides for the channels of the set to be of tortuous form, and this statement also applies to the passage formed by the inner baffle of a set.
- 70 It is to be understood that the elements 6 and 8 of the form shown by Figure 1 and the elements 39 and 44 of the form shown by Figure 3 constitute what may be termed a nozzle structure. It is furthermore to be understood that the

ejectors 6 and 36 include as a part thereof a nozzle and a director.

With reference to the modified form shown by Figure 7, it is to be understood that it will include a like arrangement of the spaced sets of coaxially arranged spaced baffles, and a conoidal shaped deflector as heretofore referred to, but the baffles and deflector are not illustrated in Figure 7. With reference to the modified form shown by Figure 8 it is to be understood that it will include a like arrangement of spaced sets of coaxially arranged spaced baffles and a conoidal shaped deflector as heretofore referred to, but the baffles and deflector are not illustrated in Figure 8.

With further reference to Figure 7 the muffler 56 includes a housing or casing 57 of the same form as the housing or casing 2, with this exception that the rear end closure 58 for housing 57 is not only formed with an eccentrically disposed opening 59 but with an axial opening 60. The ejector structure 61 forming an element of the muffler 56 will correspond in form to that of the ejector structure 6, with this exception the structure 51 has as an element thereof a valve controlled air supply means arranged coaxially of the element 11. The said air supply means consists of a pipe 62 having a tapered forward end portion 63 arranged rearwardly of and in proximity to the said tapered forward end portion 14. The pipe 62 extends rearwardly through the opening 60 and is connected to a control valve 64 which is attached to an air supply line 65. Otherwise than that as stated the construction of the ejector structure 61 will conform to the ejector structure 6.

With further reference to Figure 8 the muffler 66 includes a housing or casing 67 of the same form of the housing 33 with the exception that the closure 68 for the rear end of housing 67 is formed with an axial opening 69 of greater diameter than the opening 35 and that the rear face of the closure 68 is provided with a collar 70 forming a rearward extension of the wall of opening 69. The inner face of collar 70 and the wall of opening 69 are threaded as at 70^a, 69^a respectively. The ejector structure 71 employed in the muffler 66 is somewhat similar in construction to the ejector structure 38 and the differences of the structure 71 with respect to the structure 38 will now be referred to. The nozzle element 72 of the structure 71 has its intermediate portion 73 and its rear portion 74 of greater length than the portions 41, 42 of the nozzle element 39 of the structure 38 and this statement also applies to the length of the director element 75 of the structure 71 with respect to the element 46 of the structure 38. The said intermediate portion 73 at its rear end is provided with peripheral threads 76 and forwardly of said threads with a circumferential row of spaced ports 77 for the entrance of exhaust gas from housing 67. The said intermediate portion 73 conforms in contour to the intermediate portion 41 of the nozzle element 39. The said rear portion 74 corresponds substantially in contour to the rear portion 42 of the element 39. The element 72 extends rearwardly through the opening 69 and collar 70 and the said threads 76 coact with the threads on the wall of opening 69 and on the inner face of collar 70 for securing the ejector structure 71 to and axially of the rear portion of housing 67. The rear portion 74 of element 72 is arranged rearwardly of collar 70 and it is provided, intermediate its ends with a

circumferential row of spaced air intake ports 78 controlled by an annular adjustable apertured shutter 79 arranged within and slidably connected to the said portion 74. The latter is slotted, as at 80 for the passage of an outwardly directed shifting arm 81 for the shutter 79. The portion 74 is open at its rear end and has projecting from such end an interiorly threaded collar 82. The director element 75 of the structure 71 is not only of greater length than the director element 46, but it extends rearwardly from the element 72 and is formed with peripheral threads for securing it to the threaded collar 82, whereby the elements 72, 75 will be connected together and disposed coaxially. The element 75 is adapted to communicate with the outlet line for exhaust gases from the engine. The forward portion of the element 72 is indicated at 83. Otherwise than that as stated the ejector structure 71 will conform to the ejector structure 38. Parts of the structure 71 which correspond to parts of the structure 38 are indicated by corresponding reference characters.

With respect to the muffler 1, the exhaust gases conducted by the pipe 19 to the ejector structure 6 will be acted upon by the vanes 15 to impart a spiral movement to the gases which comes to the center of the part 10 of such structure and cause suction on the gases entering the element 11 which draws any gases in the rear of the housing through the element 11, the volume of which and combined pressure of which will be greater than that of the gas passing through pipe 19 and through the vanes 15. The gases passing through the element 11 will also add to the spiral movement of the gases in part 10, causing the increased volume and combined pressure of the gases in part 10 to overbalance the gases in the pipe 19 and thereby cause a degree of suction upon the gases in the exhaust line. The part 10 must be of a length sufficient for the gases to come to the center thereof and the longer the part 10 is, the better the pull.

The overbalancing by the stream of gas in part 10 of element 8 may be augmented by the introduction of a stream of cold atmospheric air into the center of the element 11, because the pressure of the gases in part 10 of element 8 will be increased when, at this point, the stream of cold air mixes with the hot gases, causing an expansion of the cold air and an increase of the pressure thereof. The construction disclosed by Figure 7 provides for the introduction of the air as referred to. The size of the part 10 of element 8, permits a getaway of the mixture of hot gas and cold air after the expansion point. The effect of the increased pressure at such point is to overbalance it to a greater degree the stream of gas coming through from pipe 19, through the ejector nozzle creating a more pronounced suction at the exhaust line than is affected without the use of the cold air, although, as stated heretofore, the use of the inner stream of warm gas also overbalances the stream of hot gases coming through pipe 19 on account of the combined pressure of the increased volume of gas going through the element 11 upon rotating in part 10 of element 8 is greater than the pressure of the gas coming through pipe 19.

With reference to Figures 8 and 9 a structure 70 is illustrated including an adjustable means which provides for the use of atmospheric air to create expansions and augment the pressure going through the ejector structure.

The use of the outside cold air may be in such

volume as desired, either by covering the entire diameter of element 75 or by supplying the air to the center of element 11, in which case the exhaust that spreads to the rear part of the muffler will be drawn in through the element 75.

The operation of the gases, after leaving an ejector structure, whether combined with air or without is first to impact the peak of the deflector 31 or 37 and which causes a deflection of the gases, after which they enter passage 30 and the channels 28, 29 of the rearmost set of baffles, and then the gases pass through the passages and channels of the other sets of baffles. Owing to the arrangement of the baffles of each set, the gases will be spread through the length of the set, and this results in a killing of the sound waves and expansion of the gas, having a necessary silencing effect and yet, eliminating the holding back of the gas in its course. The flow of the gas towards the exit is not hindered by the use of the baffles of the form as shown.

The spiral courses formed by the baffles of each set will provide for an additional suction as the gases travel towards the exit end of the muffler, and the tendency of the gases moving in a spiral course and completely filling the available spaces between the baffles of each set in a rotary movement is to create additional suction.

The operation of the muffler 32 will accomplish the same result as the muffler, but in lieu of supplying the exhaust gas directly into the element 39 is supplied directly into the element 46 and the vanes on the inner face of element 46 will impart a spiral movement to the gas as it is discharged from element 46 and provide a suction on the gas which enters element 39 through the ports 45. The vanes on the outer face of element 46 will also impart a spiral movement to the gas as it passes between 44 and 50 to part 40. The latter is to be of the same length as part 10 for the purpose of providing the gases passing therethrough to cause a degree of suction upon the gases in the exhaust line.

With respect to the forms of the device shown by Figures 1 and 7, the gas enters into the injector at an angle with respect to the axis of the director and this angle is essential for only in this manner does the pressure of the gas become evenly distributed about the director. The gas is taken directly into the forms of the device shown by Figures 3 and 8, whereby the pressure thereof is naturally evenly distributed when the gas reaches the head of the director.

What I claim is:

1. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, and an ejector structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, an internal annular tapered face and a tubular director formed with a tapered forward end terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face.

2. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, and an ejector

structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, means for directing the exhaust gases into and at an angle with respect to the axis of the director, an internal annular tapered face and a tubular director formed with a tapered forward end terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face, the said tapered forward end terminal portion of the director being provided on its inner face with blades.

3. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, and an ejector structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, an internal annular tapered face and a tubular director formed with a tapered forward end terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face, said blades being spirally arranged relative to the said end terminal portion.

4. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, and an ejector structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, an internal annular tapered face and a tubular director formed with a tapered forward end terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face, the said tapered forward end terminal portion of the director being provided on its inner face with blades, the said blades on the inner and outer faces of the said end terminal portion being spirally arranged relative to such portion.

5. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles of spiral form within said housing rearwardly of said outlet, the baffles of each set being arranged coaxially and correlated to provide circular channels having spiral walls and an annular passage having a spiral wall, said passage disposed coaxially with said channels, and an ejector structure arranged within the housing rearwardly of said sets for receiving exhaust gases and including a discharge nozzle and a tubular gas director arranged rearwardly of the outlet end of the nozzle, said director having its axis aligned with the axis of said passage.

6. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles of spiral form within said housing rearwardly of said outlet, the baffles of each set being arranged coaxially and correlated to provide circular channels having spiral walls and an annular passage having a spiral wall, said passage disposed coaxially with said channels, an ejector structure arranged within the housing rearwardly of said sets for receiving exhaust gases and including a discharge nozzle and a tubular gas director arranged rearwardly

of the outlet end of the nozzle, said director having its axis aligned with the axis of said passage, said structure provided intermediate its ends with an internal annular tapered surface, and said director having a tapered forward terminal portion opposing in spaced relation said tapered surface.

7. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles of spiral form within said housing rearwardly of said outlet, the baffles of each set being arranged coaxially and correlated to provide circular channels having spiral walls and an annular passage having a spiral wall, said passage disposed coaxially with said channels, an ejector structure arranged within the housing rearwardly of said sets for receiving exhaust gases and including a discharge nozzle and a tubular gas director arranged rearwardly of the outlet end of the nozzle, said director having its axis aligned with the axis of said passage, said structure provided intermediate its ends with an internal annular tapered surface, and said director having a tapered forward terminal portion opposing in spaced relation said tapered surface, the said tapered terminal portion being provided on its inner and outer faces with spirally arranged blades.

8. In a muffler a housing having an outlet, spaced aligned sets of coaxially arranged spaced spiral baffles within the housing rearwardly of said outlet, and an ejector-structure for receiving exhaust gases, said structure arranged rearwardly of said baffles and including a discharge nozzle and a tubular gas director opening into the nozzle intermediate the ends of the latter.

9. In a muffler a housing having an outlet, spaced aligned sets of coaxially arranged baffles within the housing rearwardly of said outlet, and an ejector-structure for receiving exhaust gases, said structure arranged rearwardly of said baffles and including a discharge nozzle and a tubular gas director opening into the nozzle intermediate the ends of the latter, said director being provided with internally and externally spirally arranged blades at its leading terminal portion.

10. In a suction muffler a housing having an outlet, a set of spaced coaxially arranged spaced spiral baffles within the housing rearwardly of the outlet, said baffles correlating to form a plurality of circular channels having spiral walls, the inner one of said baffles providing an annular passage having a spiral wall, each of said baffles being so formed to provide interrupted walls for the channels and the passage, and an ejector-structure within the housing rearwardly of the baffles for receiving and directing exhaust gases towards said baffles.

11. A muffler comprising a housing having an outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, an ejector structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, an internal annular tapered face and a tubular director formed with a tapered forward end terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face, and means for supplying air into said ejector structure.

12. A muffler comprising a housing having an

outlet, a plurality of spaced aligned sets of spaced annular baffles within said housing and arranged coaxially, the baffles of each set being so formed to provide a plurality of coaxially arranged tortuous channels and a tortuous passage disposed coaxially with said channels, an ejector structure arranged in said housing rearwardly of said sets for receiving exhaust gases and including a nozzle, an internal annular tapered face and a tubular director formed with a tapered forward terminal portion having its periphery provided with blades opposing in spaced relation the said tapered face, said nozzle extending forwardly from said tapered inner face, and means for supplying air into said ejector structure, said air supplying means being controllable.

13. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced spiral baffles arranged within the housing, an ejector structure for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of the said other means, said nozzle and director being coaxially arranged.

14. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced spiral baffles arranged within the housing, an ejector structure for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of and opening into the said other means, said nozzle and director being coaxially arranged, and means for supplying air into said gas director.

15. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced baffles arranged within the housing, an ejector structure for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of and opening into the said other means, said discharge nozzle being provided intermediate its ends and on its inner face with an annular tapered surface, said gas director having its outer terminal portion of tapered form encompassed by said inclined surface, the tapered outer terminal portion of said director being provided on its inner and outer face with vanes, said nozzle and director being coaxially arranged, and means for supplying air into said nozzle providing means.

16. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced baffles arranged within the housing, an ejector structure for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of and opening into the said other means, said discharge nozzle being provided intermediate its ends and on its inner face with an annular tapered surface, said gas director having its outer terminal portion of tapered form encompassed by said inclined surface, the tapered outer terminal portion of said director being provided on its inner and outer face with vanes, said nozzle and director being coaxially arranged, the said ejector structure provided with means for establishing communication between the interior thereof and the interior of the rear portion of said housing.

17. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced baffles arranged within the housing, an ejector structure, for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of the said other means, said nozzle and director being coaxially arranged, said nozzle provided with means having a tapered surface intermediate the ends of its inner face, said director having a part of its outer periphery tapered, said tapered part formed with blades opposing in spaced relation said tapered surface.

18. In a muffler, a housing having an outlet, spaced aligned sets of coaxially arranged spaced baffles arranged within the housing, an ejector structure, for receiving exhaust gases arranged within the housing rearwardly of said sets, said structure including tubular means providing a discharge nozzle and tubular means providing a gas director positioned within the rear portion of the said other means, said nozzle and director being coaxially arranged, the said ejector structure provided with means for establishing communication between the interior thereof and the interior of the rear portion of said housing, said nozzle provided therein with means having a tapered surface intermediate the ends of its inner face, said director being formed with blades at the forward end portion of its outer face opposing

in spaced relation said tapered surface and with blades on the forward end portion of the inner face.

19. A muffler comprising a housing having an outlet, baffling means within said housing rearwardly of said outlet for the passage of the exhaust gases, and an ejector structure for injecting gases into said means, said structure arranged in said housing rearwardly of said means, and including a sleeve having an internal tapered surface, a nozzle extended forwardly from said surface and a tubular director axially of said sleeve for receiving the exhaust gases formed with a tapered end terminal portion having its periphery provided with blades opposing in spaced relation the said surface.

20. A muffler comprising a housing having an outlet baffling means within said housing rearwardly of said outlet for the passage of the exhaust gases, and an ejector structure for injecting gases into said means, said structure arranged in said housing rearwardly of said means, and including a sleeve having an internal tapered surface, a nozzle extended forwardly from said surface and a tubular director axially of said sleeve for receiving the exhaust gases formed with a tapered end terminal portion having its periphery provided with blades opposing in spaced relation the said surface, and means extending into the housing for directing the exhaust gases into and at right angle to the director.

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