



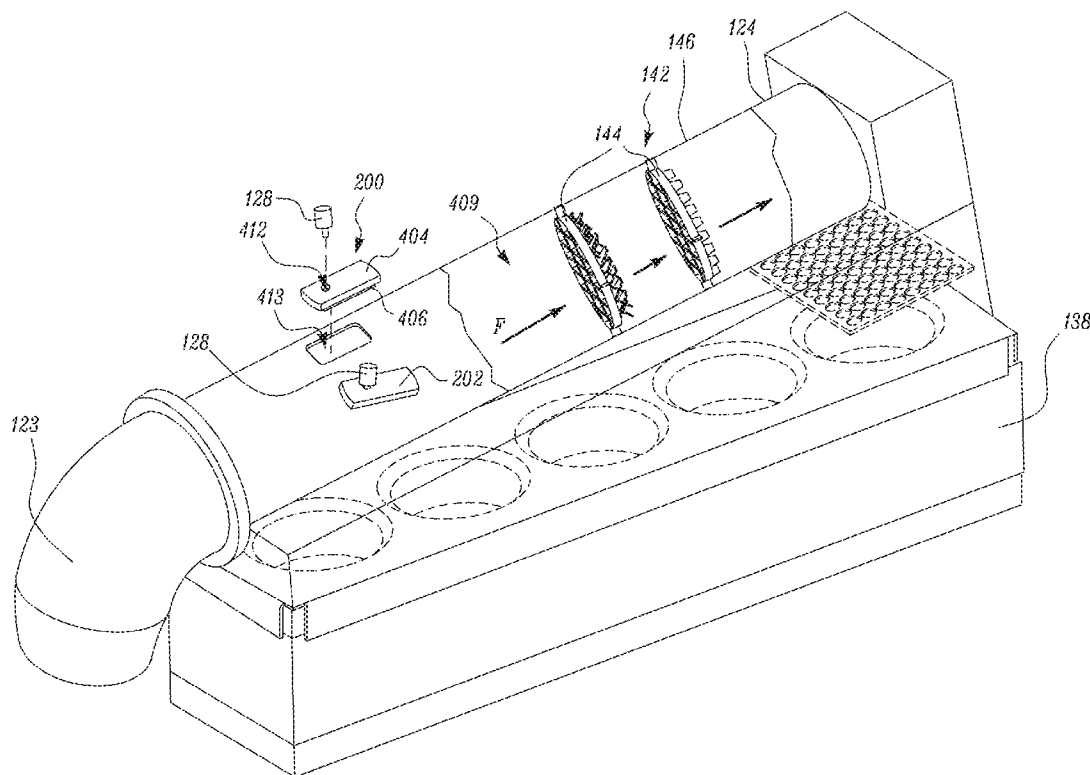
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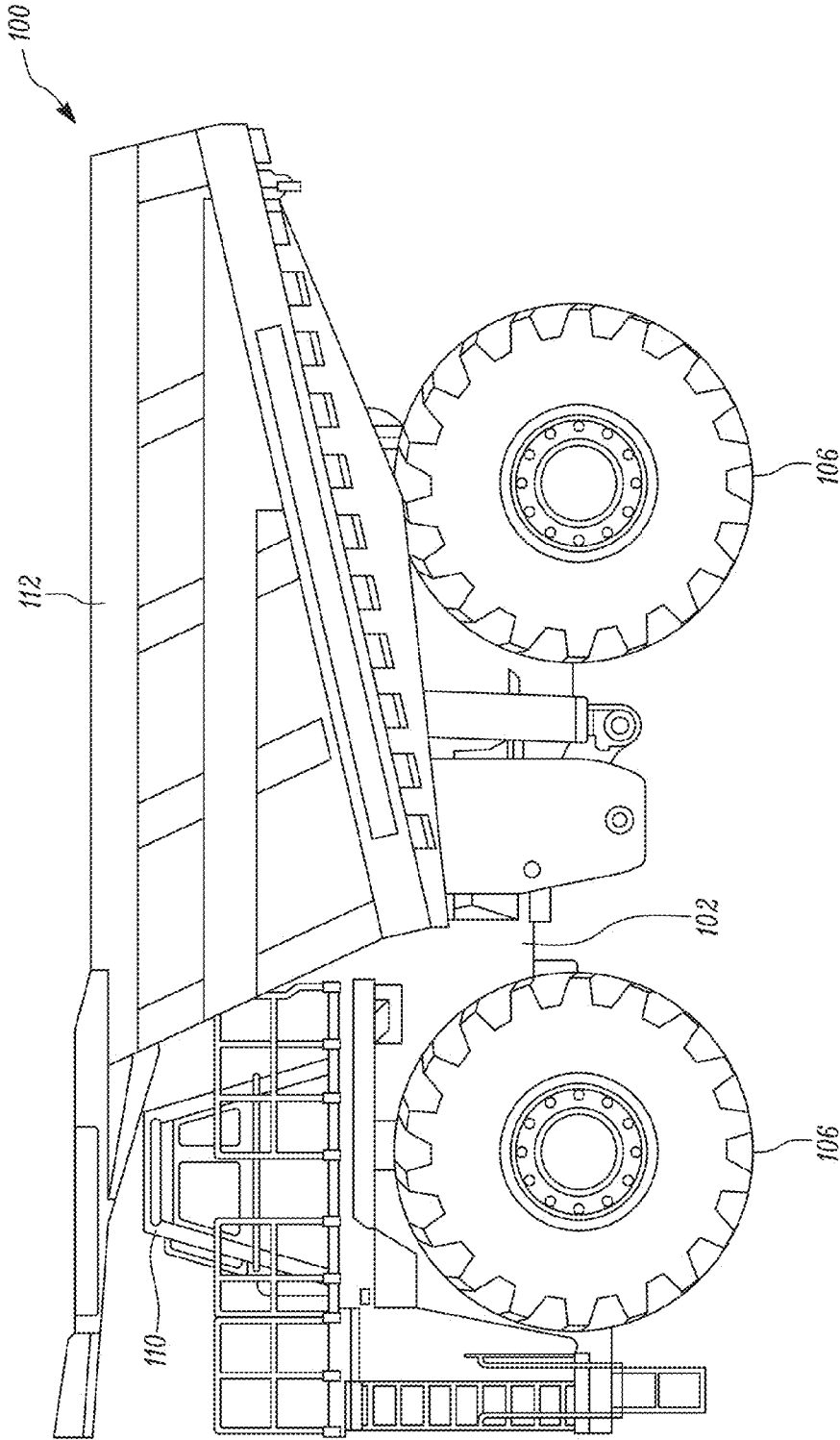
(19) **United States**(12) **Patent Application Publication****Venkataraghavan et al.**(10) **Pub. No.: US 2016/0245142 A1**(43) **Pub. Date: Aug. 25, 2016**(54) **REDUCTANT INJECTOR MOUNT**(71) Applicant: **Caterpillar Inc.**, Peoria, IL (US)(72) Inventors: **Jayaraman Venkataraghavan**, Dunlap, IL (US); **James J. Driscoll**, Dunlap, IL (US); **David A. Akers**, Morton, IL (US)(73) Assignee: **Caterpillar Inc.**, Peoria, IL (US)(21) Appl. No.: **14/628,836**(22) Filed: **Feb. 23, 2015****Publication Classification**(51) **Int. Cl.**
F01N 3/28 (2006.01)
F01N 3/20 (2006.01)(52) **U.S. Cl.**CPC **F01N 3/2839** (2013.01); **F01N 3/2066** (2013.01); **F01N 2340/00** (2013.01)

(57)

ABSTRACT

A reductant injector mount is provided. The reductant injector mount includes a mounting region configured to connect to an exhaust conduit. The reductant injector also includes a contoured region formed in the mounting region. The contoured region is configured to increase a velocity of an exhaust gas flow through the contoured region. The contoured region is also configured to reduce a recirculation of the exhaust gas flow through the contoured region. Further, the reductant injector mount includes a cut out portion provided on the contoured region. The cut out portion is configured to receive a reductant injector tip therethrough.





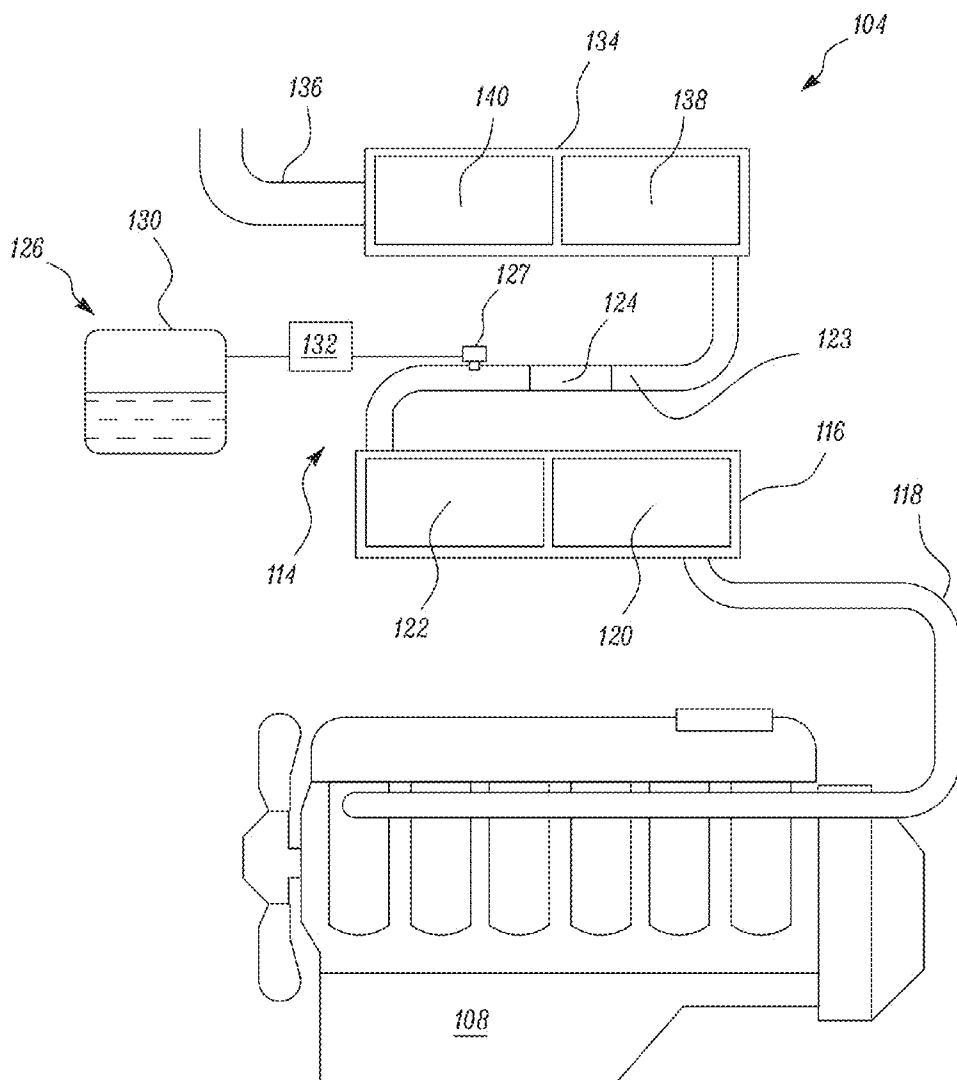
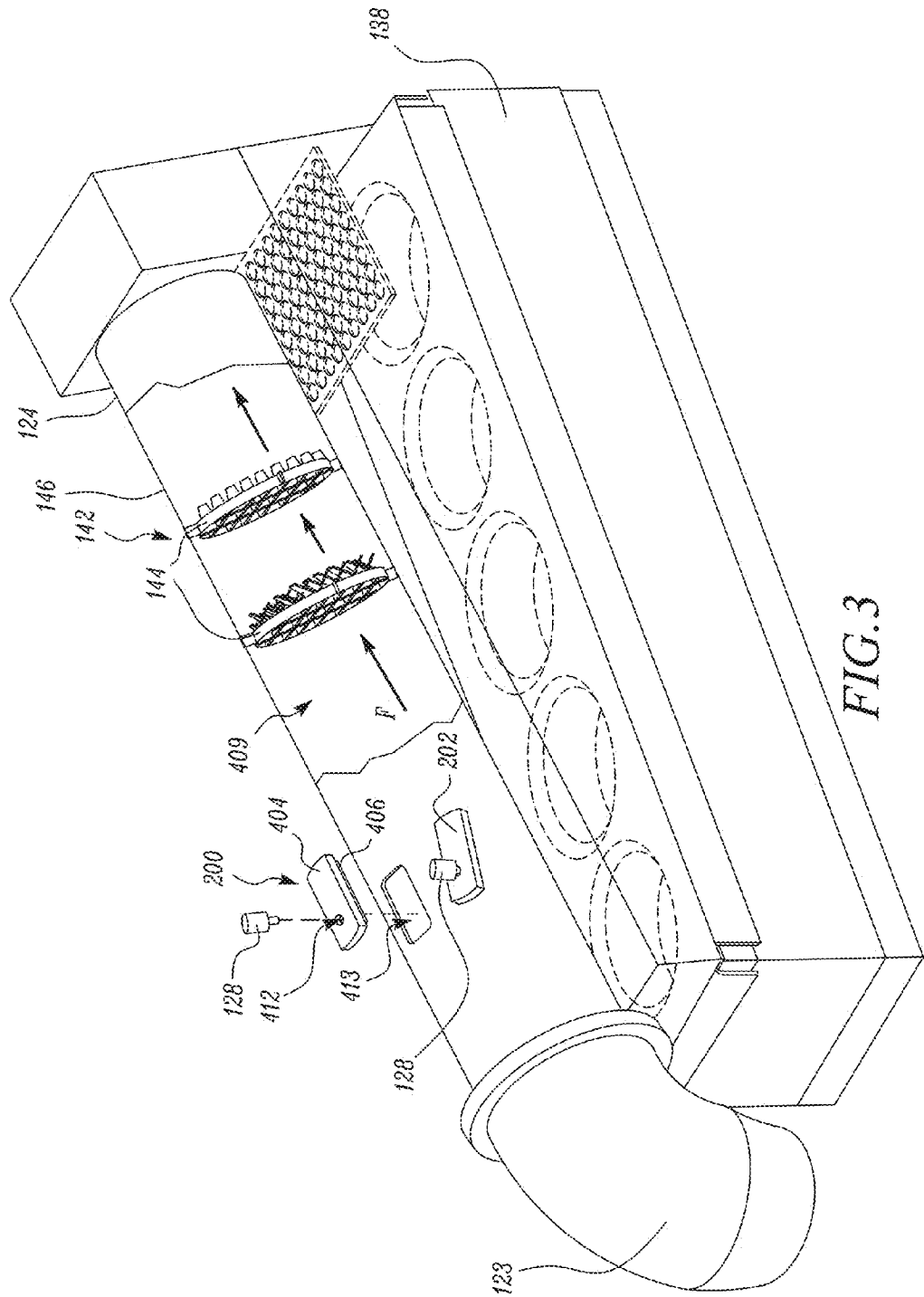


FIG. 2



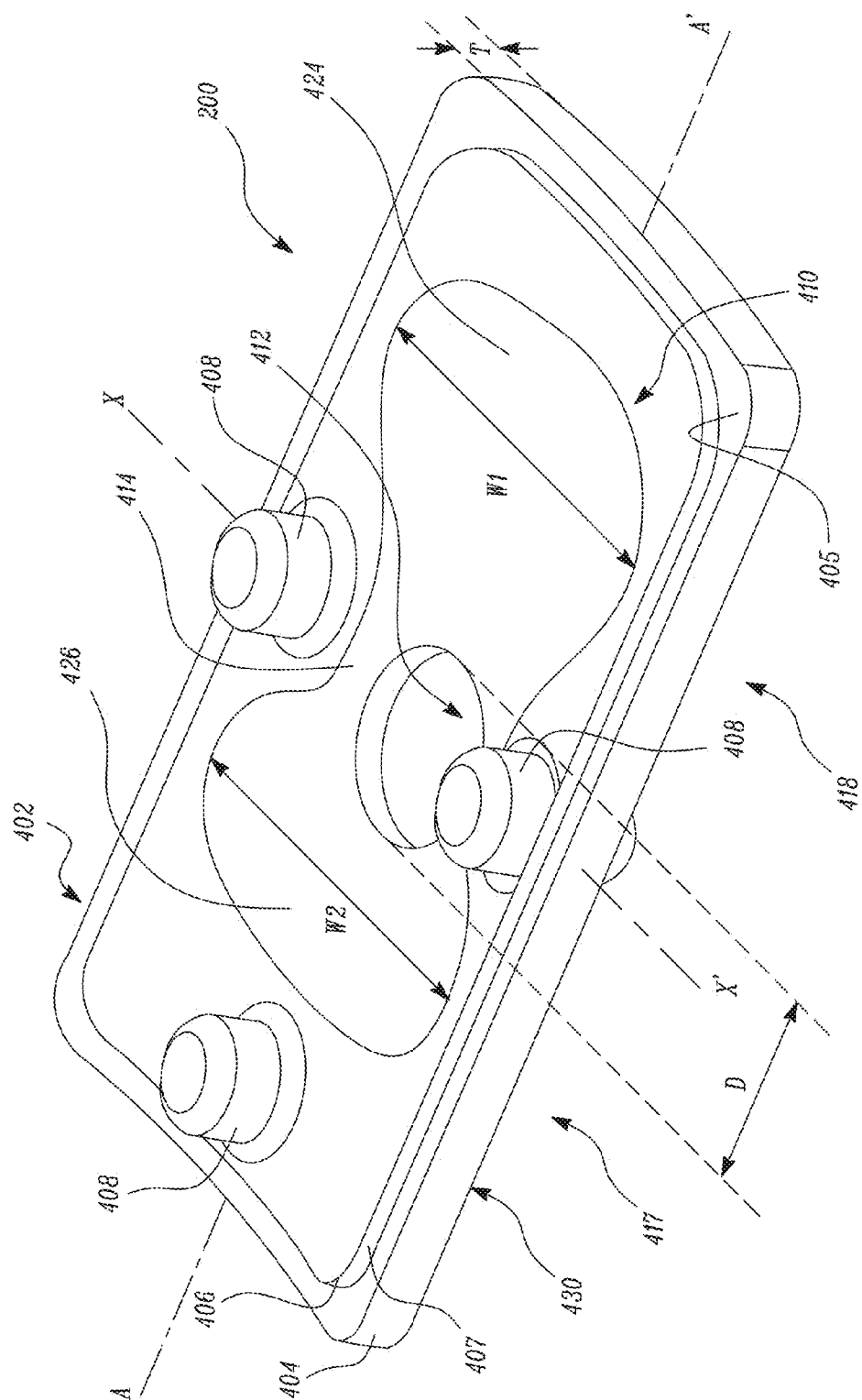
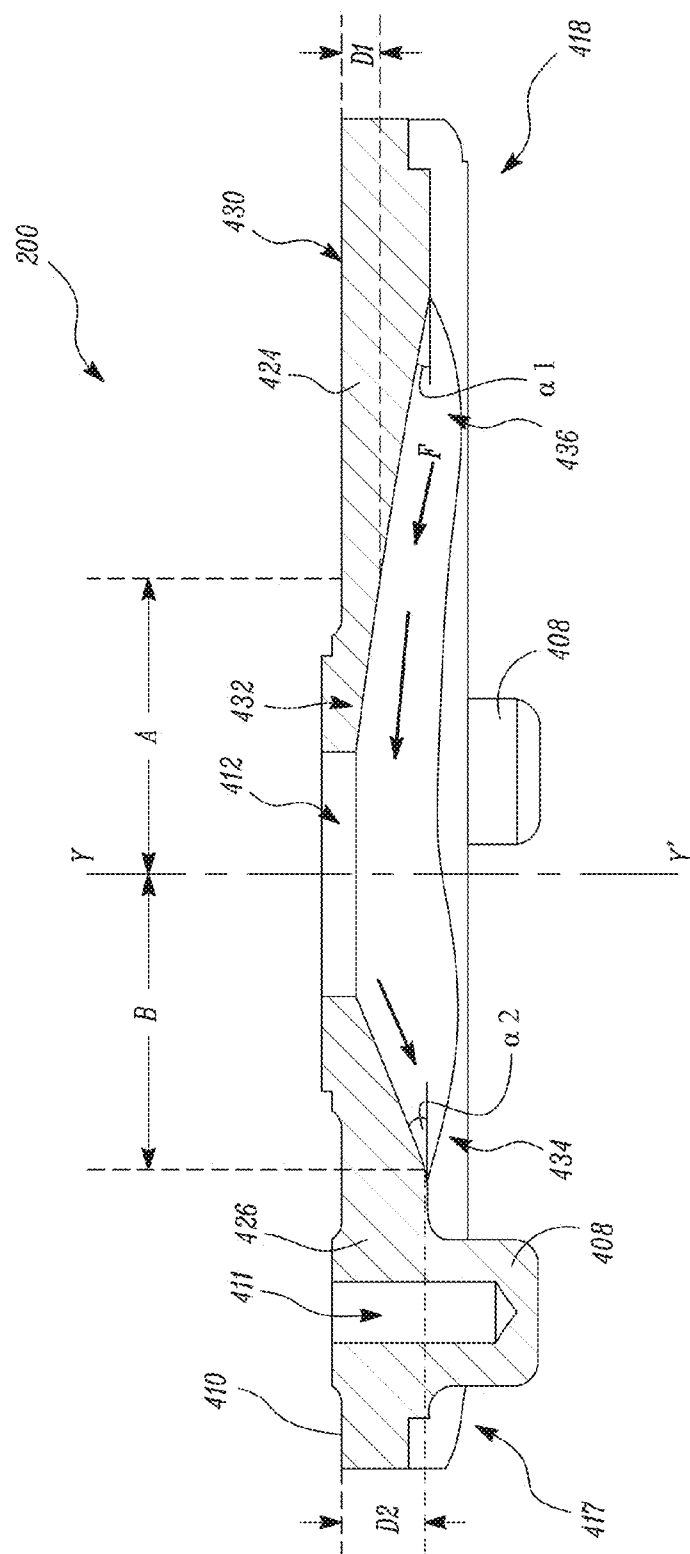


FIG. 4



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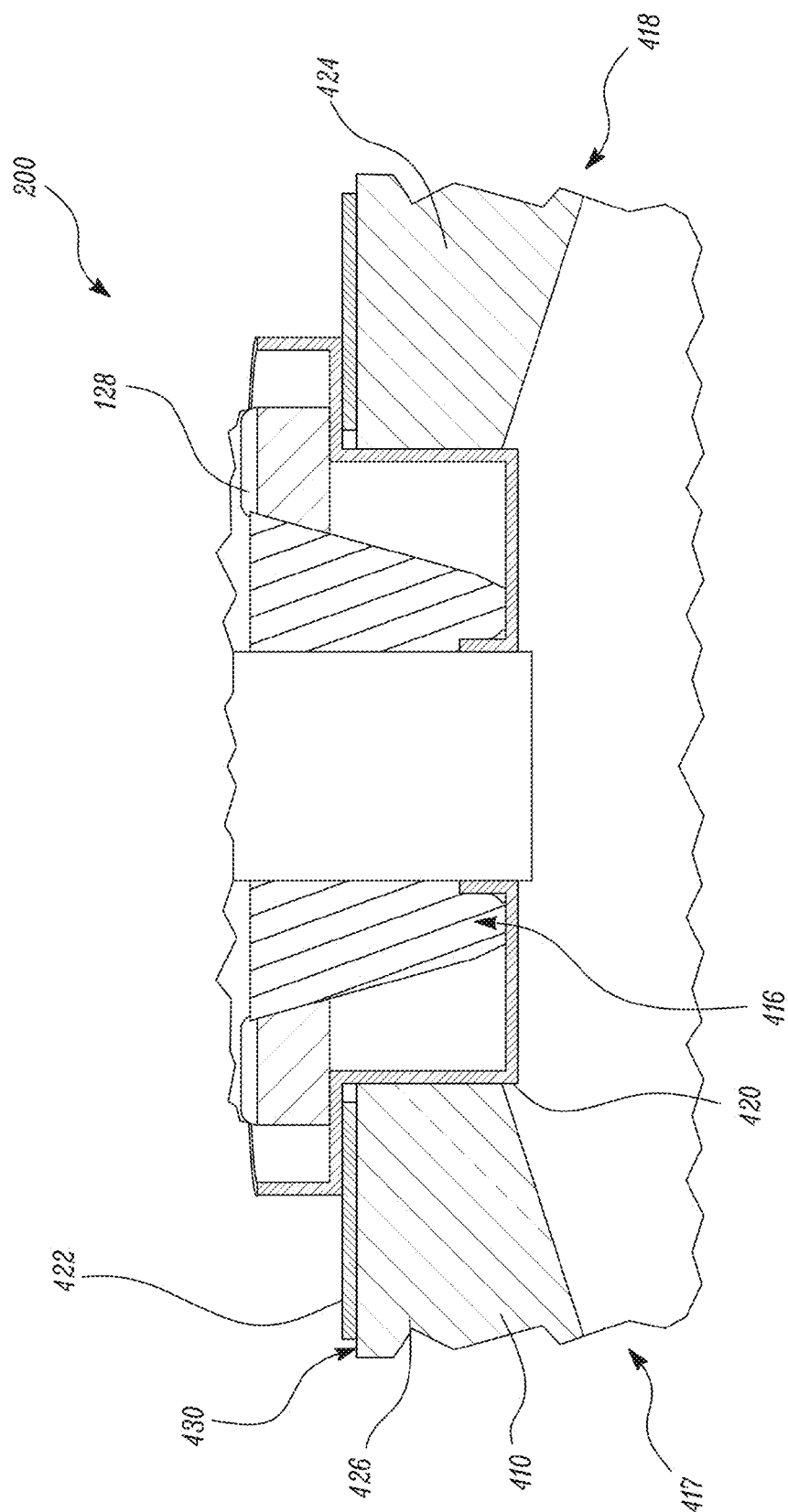


FIG. 6*

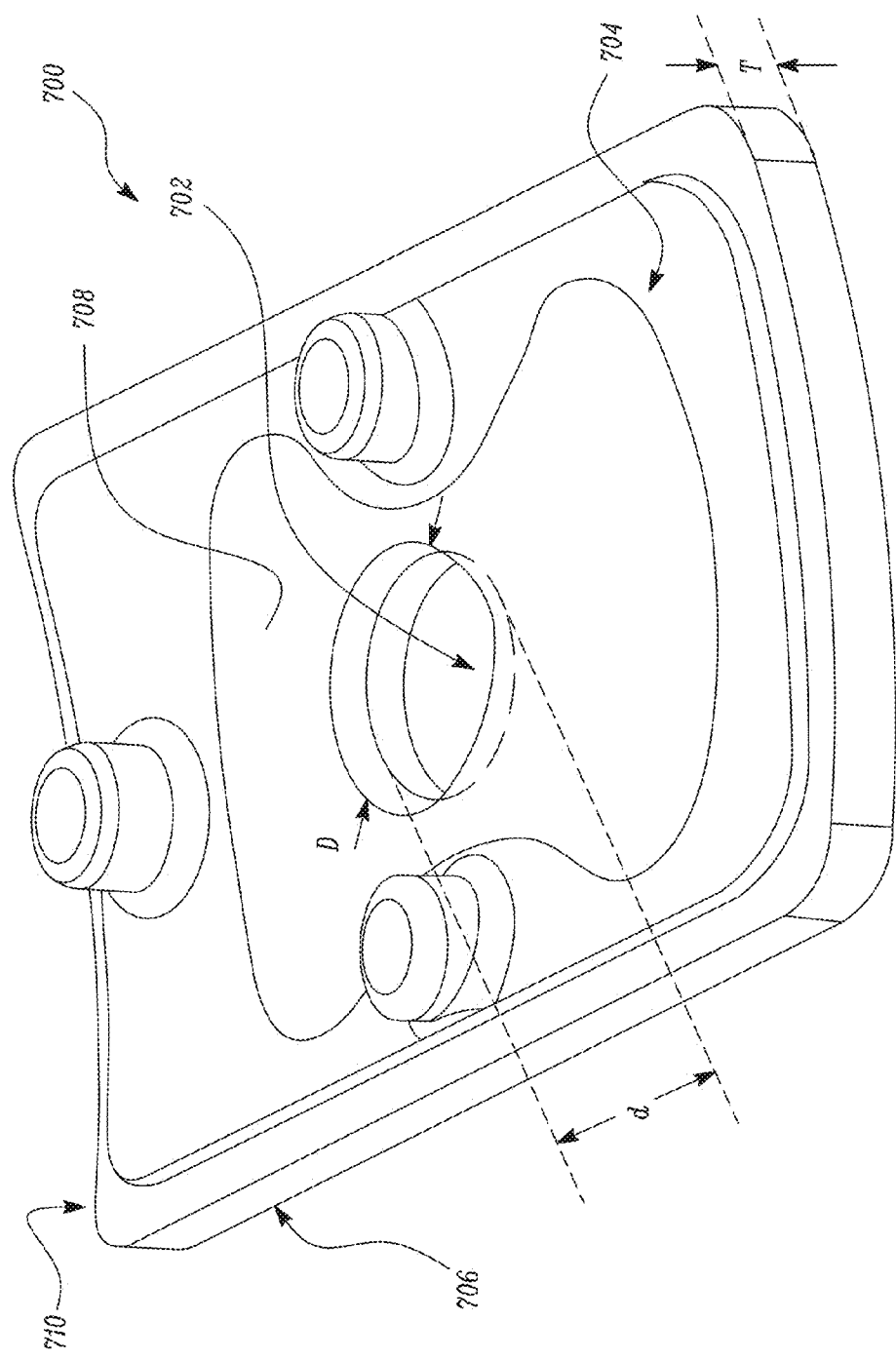


FIG. 7

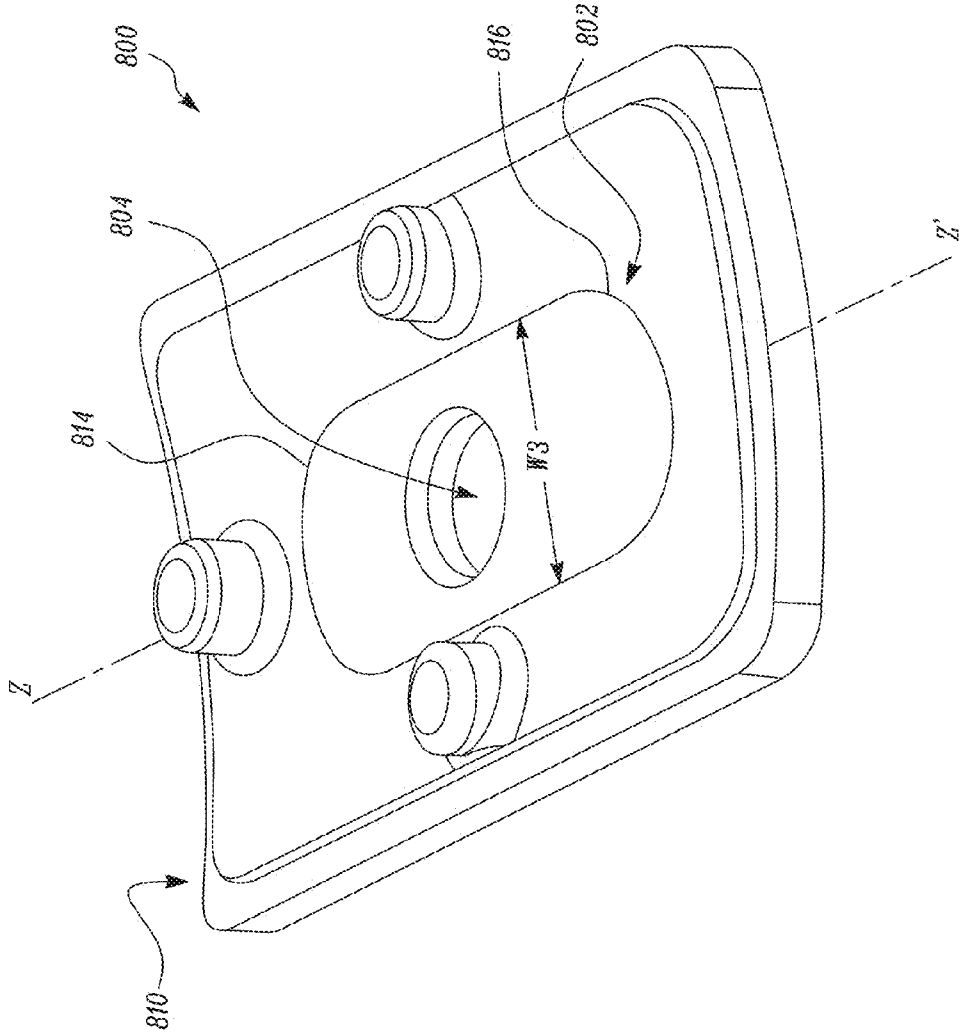


FIG. 8

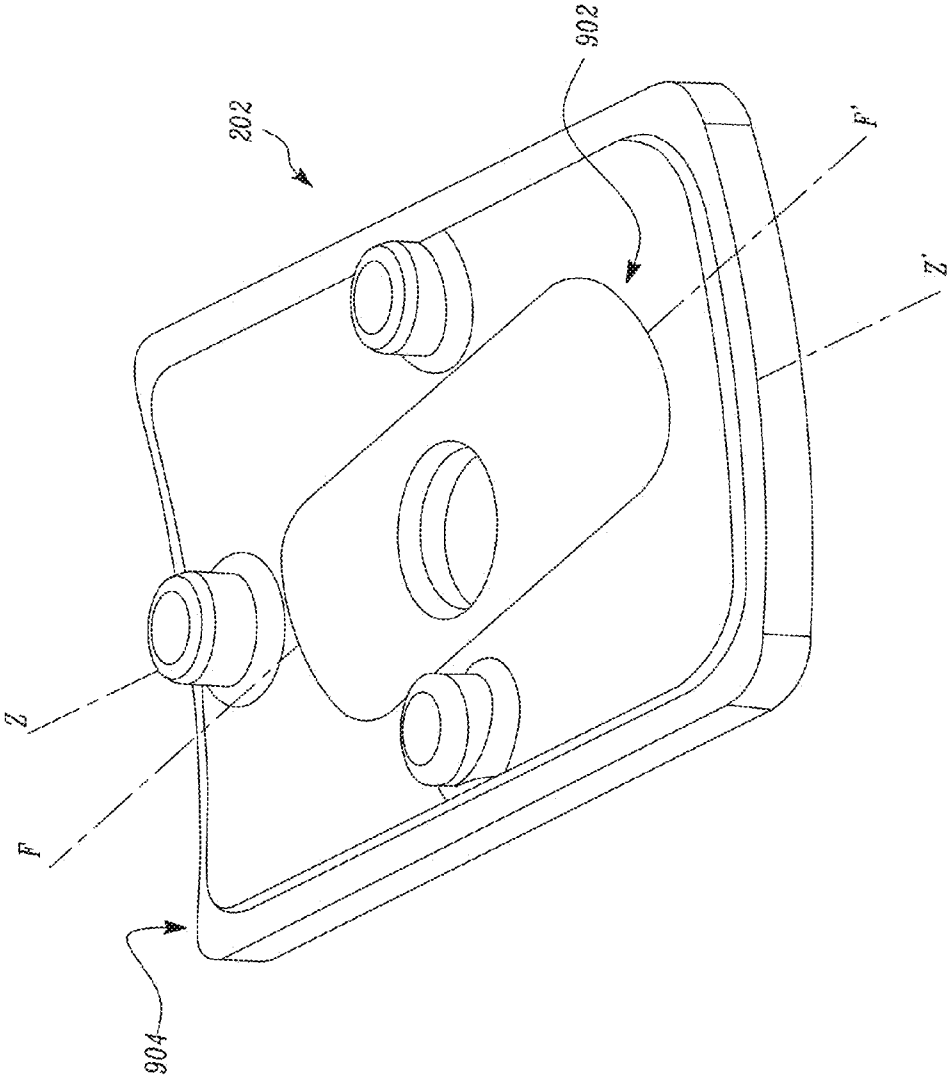
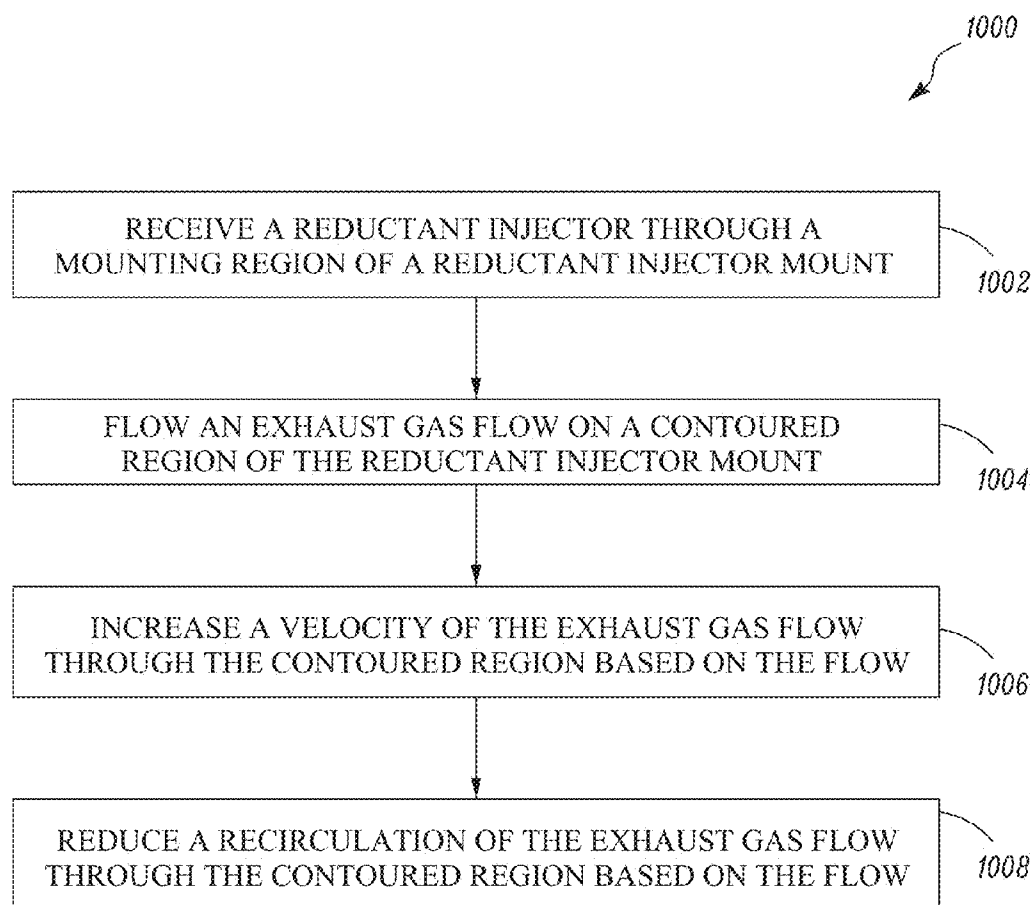


FIG. 9

*FIG. 10*

REDUCTANT INJECTOR MOUNT

TECHNICAL FIELD

[0001] The present disclosure relates to an injector mount, and more particularly to a reductant injector mount associated with an aftertreatment system of an engine.

BACKGROUND

[0002] An aftertreatment system is associated with an engine system. The aftertreatment system is configured to treat and reduce oxides of nitrogen (NO_x) present in an exhaust gas flow, prior to the exhaust gas flow exiting into the atmosphere. In order to reduce NO_x, the aftertreatment system may include a reductant delivery module, a reductant injector, and a Selective Catalytic Reduction (SCR) module.

[0003] The reductant injector is configured to inject a reductant into the exhaust gas flowing through a mixing tube of the aftertreatment system. The reductant may include urea. In order to achieve improved levels of NO_x conversion, better flow distribution and mixing of the reductant with the exhaust gases must be achieved. A mixing system is affixed inside the mixing tube so that increased turbulence and improved distribution of the reductant within the exhaust gases may be achieved within a length of the mixing tube.

[0004] A reductant injector mount is used to couple the reductant injector to the mixing tube. However, urea deposit formation may take place in an area near to an injection point of the reductant injector. Such urea deposition may hinder or prevent reductant spray and/or interaction with the exhaust gas flow, and may also cause a reduction in NO_x conversion in the aftertreatment system.

[0005] U.S. Pat. No. 8,079,211 describes systems and methods provided for injecting liquid reductant into an engine exhaust. In one example, the system includes a gas deflector positioned upstream of an injector where the gas deflector is configured to create a high pressure zone upstream of the deflector and a low pressure zone downstream of the deflector surrounding the injector outlet. A bypass flow passage diverts exhaust flow from the high pressure zone upstream of the deflector to allow the bypassed portion of exhaust to flow into the exhaust gas stream to form a gas shield for a liquid reductant spray from the injector.

SUMMARY OF THE DISCLOSURE

[0006] In one aspect of the present disclosure, a reductant injector mount is provided. The reductant injector mount includes a mounting region configured to connect to an exhaust conduit. The reductant injector also includes a contoured region formed in the mounting region. The contoured region is configured to increase a velocity of an exhaust gas flow through the contoured region. The contoured region is also configured to reduce a recirculation of the exhaust gas flow through the contoured region. Further, the reductant injector mount includes a cut out portion provided on the contoured region. The cut out portion is configured to receive a reductant injector tip therethrough.

[0007] In another aspect of the present disclosure, an aftertreatment system is provided. The aftertreatment system includes an exhaust conduit having a cut out region. The aftertreatment system also includes a selective catalytic reduction module coupled to the exhaust conduit. The aftertreatment system further includes a reductant injector mount disposed on the exhaust conduit. The reductant injector

mount is positioned upstream of the selective catalytic reduction module with respect to an exhaust gas flow. The reductant injector mount includes a mounting region connected to the exhaust conduit. The reductant injector mount also includes a contoured region formed in the mounting region. The contoured region faces an inner side of the exhaust conduit. The contoured region is configured to increase a velocity of the exhaust gas flow through the contoured region. The contoured region is also configured to reduce a recirculation of the exhaust gas flow through the contoured region. Further, the reductant injector mount includes a cut out portion provided on the contoured region. The aftertreatment system includes a reductant injector in fluid communication with the exhaust conduit, wherein the reductant injector mount is received through the cut out portion provided on the reductant injector mount.

[0008] In yet another aspect of the present disclosure, a method of controlling an exhaust gas flow in an exhaust conduit is provided. The method includes receiving a reductant injector through a mounting region of a reductant injector mount. The method also includes flowing an exhaust gas flow on a contoured region of the reductant injector mount. The method further includes increasing a velocity of the exhaust gas flow through the contoured region based on the flow. The method includes reducing a recirculation of the exhaust gas flow through the contoured region based on the flow.

[0009] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a side view of an exemplary machine, according to one embodiment of the present disclosure;

[0011] FIG. 2 is a schematic view of an exemplary engine system associated with the machine, according to one embodiment of the present disclosure;

[0012] FIG. 3 is a perspective view of a portion of an aftertreatment system associated with the engine system;

[0013] FIG. 4 is a perspective view of a reductant injector mount, according to one embodiment of the present disclosure;

[0014] FIG. 5 is a cross sectional view of the reductant injector mount and a reductant injector received therein;

[0015] FIG. 6 is a cross sectional view of the reductant injector mount of FIG. 4;

[0016] FIGS. 7 to 9 are perspective views of reductant injector mounts, according to various embodiments of the present disclosure; and

[0017] FIG. 10 is a flowchart for a method of controlling exhaust gas flow in an exhaust conduit.

DETAILED DESCRIPTION

[0018] Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or the like parts. An exemplary embodiment of a machine **100**, according to the present disclosure is shown in FIG. 1. The machine **100** may be a mining truck, as shown, or may include any off-highway or on-highway vehicle using a fuel-powered engine, as described herein. The machine **100** generally includes a machine frame **102** for supporting, among other systems and components, an engine system **104** (see FIG. 2) which will be discussed in greater detail in connection with FIG. 2.

[0019] The machine 100 also includes a plurality of ground-engaging elements 106, in this case being wheels. As should be appreciated by one of ordinary skill in the art, an engine 108 (see FIG. 2) of the engine system 104 may provide propulsion power for the ground-engaging elements 106 and may power a variety of other machine systems, including various mechanical, electrical, and hydraulic systems and/or components. Further, the machine 100 may also include an operator control station 110, including a variety of operator controls and displays useful for operating the machine 100 and/or a dump body 112 which may be pivotal relative to the machine frame 102.

[0020] Referring to FIG. 2, a schematic diagram of the engine system 104 is illustrated, according to one embodiment of the present disclosure. The engine system 104 includes the engine 108, which may be an internal combustion engine, such as, a reciprocating piston engine or a gas turbine engine. The engine 108 may be a spark ignition engine or a compression ignition engine, such as, a diesel engine, a homogeneous charge compression ignition engine, or a reactivity controlled compression ignition engine, or other compression ignition engines known in the art. The engine 108 may be fueled by gasoline, diesel fuel, biodiesel, dimethyl ether, alcohol, natural gas, propane, hydrogen, combinations thereof, or any other combustion fuel known in the art.

[0021] The engine 108 may include other components (not shown), such as, a fuel system, an intake system, a drivetrain including a transmission system, and so on. The engine 108 may be used to provide power to any machine including, but not limited to, an on-highway truck, an off-highway truck, an earth moving machine, an electric generator, and so on. Accordingly, the engine system 104 may be associated with an industry including, but not limited to, transportation, construction, agriculture, forestry, power generation, and material handling.

[0022] Referring to FIG. 2, the engine system 104 includes an aftertreatment system 114 fluidly connected to an exhaust manifold of the engine 108. The aftertreatment system 114 is configured to treat an exhaust gas flow exiting the exhaust manifold of the engine 108. The exhaust gas flow contains emission compounds that may include oxides of nitrogen (NOx), unburned hydrocarbons, particulate matter, and/or other combustion products known in the art. The aftertreatment system 114 may be configured to trap or convert NOx, unburned hydrocarbons, particulate matter, combinations thereof, or other combustion products present in the exhaust gas flow, before exiting the engine system 104.

[0023] In the illustrated embodiment, the aftertreatment system 114 includes a first module 116 that is fluidly connected to an exhaust conduit 118 of the engine 108. During engine operation, the first module 116 is arranged to internally receive engine exhaust gas from the exhaust conduit 118. The first module 116 may contain various exhaust gas treatment devices, such as, a Diesel Oxidation Catalyst (DOC) 120 and a Diesel Particulate Filter (DPF) 122, but other devices may be used. The first module 116 and the components found therein are optional and may be omitted for various engine applications in which the exhaust treatment function provided by the first module 116 is not required.

[0024] In the illustrated embodiment, the exhaust gas flow provided to the first module 116 by the engine 108 may first pass through the DOC 120 and then through the DPF 122 before entering a conduit 123. The conduit 123 includes a

mixing tube 124. Further, the aftertreatment system 114 includes a reductant supply system 126. A reductant is injected into the mixing tube 124 by a reductant injector assembly 127. The reductant injector assembly 127 may include one or more reductant injectors 128 (see FIG. 3). The reductant may be a fluid, such as, Diesel Exhaust Fluid (DEF). The reductant may include urea, ammonia, or other reducing agent known in the art.

[0025] The reductant supply system 126 includes a reductant tank 130. The reductant is contained within the reductant tank 130. Parameters related to the reductant tank 130 such as size, shape, location, and material used may vary according to system design and requirements. Further, the reductant injector 128 may be communicably coupled to a controller (not shown). Based on control signals received from the controller, the reductant from the reductant tank 130 is provided to the reductant injector 128 by a pump assembly 132. As the reductant is injected into the mixing tube 124, the reductant mixes with the exhaust gas flow passing therethrough, and is carried to a second module 134. Further, the conduit 123 is configured to fluidly interconnect the first module 116 with the second module 134, such that, the exhaust gas flow from the engine 108 may pass through the first and second modules 116, 134 in series before being released at a stack 136 connected downstream of the second module 134.

[0026] The second module 134 encloses a Selective Catalytic Reduction (SCR) module 138 and an Ammonia Oxidation Catalyst (AMOX) 140. The SCR module 138 operates to treat exhaust gases exiting the engine 108 in the presence of ammonia, which is provided after degradation of a urea-containing solution injected into the exhaust gas flow in the mixing tube 124. The AMOX 140 is used to convert any ammonia slip from the downstream flow of the SCR module 138 before exiting the stack 136.

[0027] FIG. 3 illustrates a partial cutaway perspective view of a portion of the conduit 123 shown in FIG. 2, depicting the mixing tube 124 and the SCR module 138 located downstream of the conduit 123, according to one embodiment of the present disclosure. In order to promote mixing of the reductant with the exhaust gas flow, a mixing system 142 may be associated with the aftertreatment system 114. The mixing system 142 is provided within the portion of the mixing tube 124. The mixing system 142 may be positioned downstream of the reductant injector assembly 127 and upstream of the SCR module 138. The mixing system 142 includes a plurality of mixing elements 144. The mixing elements 144 may include same or different type of mixing elements. For example, the mixing elements 144 may include flapper mixers, swirl mixers, impingement mixers, and the like. The amount of the reductant that may be injected into the mixing tube 124 may be appropriately metered based on engine operating conditions.

[0028] The aftertreatment system 114 disclosed herein is provided as a non-limiting example. It will be appreciated that the aftertreatment system 114 may be disposed in various arrangements and/or combinations relative to the exhaust manifold. These and other variations in aftertreatment system design are possible without deviating from the scope of the disclosure.

[0029] Reductant injector mounts 200, 202 are associated with the aftertreatment system 114. The reductant injector mounts 200, 202 are positioned upstream of the SCR module 138 with respect to an exhaust gas flow direction "F". Further, the reductant injector mounts 200, 202 are attached to a top

portion 146 of the mixing tube 124. The reductant injector mounts 200, 202 may be attached to the mixing tube 124 using a joining process, such as welding. Alternatively, any joining process, such as brazing, soldering, may be used. Further, mechanical fasteners or an adhesive may also be used for attaching the reductant injector mounts 200, 202 to the mixing tube 124. As shown in the accompanying figures, the reductant injector mounts 200 are disposed in a direction parallel to the exhaust gas flow direction "F". Whereas, the reductant injector mounts 202 are disposed in an angular orientation with respect to the exhaust gas flow direction "F". The reductant injector mount 200, 202 is configured to mount the reductant injector 128 onto the mixing tube 124. A number of the reductant injector mounts 200, 202 may depend on a number of the reductant injectors 128 associated with the aftertreatment system 114, and may vary based on system requirements.

[0030] The mixing tube 124 of the present disclosure includes two reductant injectors 128 associated therewith. Therefore, the mixing tube 124 includes two reductant injector mounts 200, 202 mounted to the top portion 146 of the mixing tube 124. It should be noted that the number of reductant injectors and the reductant injector mounts may vary. In one example, four reductant injectors and the corresponding reductant injector mounts may be provided on the mixing tube 124. The design of the reductant injector mount 200 will now be explained with reference to FIGS. 4-6.

[0031] Referring to FIGS. 3, 4, and 5, the reductant injector mount 200 has a substantially rectangular shape. The reductant injector mount 200 defines an axis A-A'. The axis A-A' is parallel to the exhaust gas flow direction "F". Alternatively, the reductant injector mount 200 may be square, circular, or elliptical in shape. The reductant injector mount 200 includes a stepped design. When mounted on the mixing tube 124, a first portion 404 of the reductant injector mount 200 may project from the top portion 146 of the mixing tube 124. Whereas a second portion 406 (see FIG. 4) of the reductant injector mount 200 may project into an interior space 409 of the mixing tube 124. Further, the top portion 146 of the mixing tube 124 includes a cut out region 413 (see FIG. 3). The cut out region 413 is configured to receive the second portion 406 of the reductant injector mount 200, in order to attach the reductant injector mount 200 with the mixing tube 124. The cut out region 413 has a rectangular shape with rounded edges. It should be noted that the shape of the cut out region 413 may vary based on the shape of the reductant injector mount 200.

[0032] The reductant injector mount 200 includes a mounting region 402. The mounting region 402 is configured to be connected to and in contact with the mixing tube 124. The mounting region 402 referred to herein collectively refers to the top surface 405 of the first portion 404 and the second portion 406 facing the exhaust gas flow.

[0033] The mounting region 402 of the reductant injector mount 200 may include a plurality of receiving elements 408. In the illustrated embodiment, the reductant injector mount 200 includes three receiving elements 408. However, a number of the receiving elements 408 may vary as per system requirements. The receiving elements 408 project from the mounting region 402 of the reductant injector mount 200.

[0034] In one example, the receiving elements 408 are configured to receive mechanical fasteners (not shown) of the reductant injector 128, in order to couple the reductant injector 128 to the reductant injector mount 200. The receiving

elements 408 include apertures 411 (see FIG. 6). In the illustrated embodiment, the apertures 411 are embodied as blind holes. Alternatively, the apertures 411 may be embodied as through-holes. In one embodiment, the receiving elements 408 may be integral with the reductant injector mount 200. Alternatively, the receiving elements 408 may be formed as a separate component and later assembled with the reductant injector mount 200. When the reductant injector mount 200 is coupled to the mixing tube 124, the receiving elements 408 may project into the interior space 409 of the mixing tube 124.

[0035] The reductant injector mount 200 includes a contoured region 410. The contoured region 410 is formed in the mounting region 402. The contoured region 410 is configured to provide a flow field for the exhaust gases flowing therethrough. The contoured region 410 is designed such that the contoured region 410 may increase a velocity of the exhaust gas flow through the contoured region 410. The contoured region 410 may also be configured to reduce a recirculation of the exhaust gases flowing therethrough. The direction of the exhaust gas flow through the contoured region 410 is marked by arrows "F" in FIG. 5.

[0036] The reductant injector mount 200 includes a cut out portion 412. The cut out portion 412 is provided on the contoured region 410 of the reductant injector mount 200. More particularly, the cut out portion 412 is positioned in a throat portion 414 of the contoured region 410. The cut out portion 412 is configured to receive a reductant injector tip 416 of the reductant injector 128 therethrough. As shown in FIG. 4, the cut out portion 412 is positioned closer to a downstream end 417 of the contoured region 410 with respect to the exhaust gas flow direction "F" as compared to an upstream end 418 of the contoured region 410. A diameter "D" of the cut out portion 412 corresponds to a diameter of the reductant injector tip 416 of the reductant injector 128.

[0037] As illustrated in FIG. 6, the cut out portion 412 of the contoured region 410 is configured to receive the reductant injector tip 416. The reductant injector 128 may be provided with a gasket 420. The gasket 420 may embody a metal clip gasket and may be configured to hold the reductant injector tip 416 in place. The gasket 422 may flush or protrude into the mixing tube 124. An excessive protrusion of the gasket 422 and thereby the reductant injector tip 416 may lead to an improper injection and distribution of the reductant within the mixing tube 124. Therefore, a depth to which the gasket 420 protrudes within the mixing tube 124 is decided optimally, based on system requirements. In some embodiments, a second gasket 422 may also be provided in contact with the gasket 420. The gaskets 420, 422 may be together configured to adjust the depth of protrusion of the reductant injector tip 416 into the mixing tube 124.

[0038] Referring to FIG. 4, the contoured region 410 includes a first lobe 424 and a second lobe 426. The first and second lobes 424, 426 are provided on either sides of the cut out portion 412. The first and second lobes 424, 426 are connected at the throat portion 414 of the contoured region 410. The first lobe 424 is positioned at a location upstream of the cut out portion 412 with respect to the exhaust gas flow direction "F" (see FIG. 5). More particularly, the first lobe 424 is positioned at the upstream end 418 of the contoured region 410 with respect to the exhaust gas flow direction "F". Whereas, the second lobe 426 is positioned downstream of the cut out portion 412 with respect to the exhaust gas flow direction "F" (see FIG. 5). More particularly, the second lobe

426 is positioned at the downstream end **417** of the contoured region **410** with respect to the exhaust gas flow direction “F”.

[0039] Referring to FIG. 4, the first lobe **424** of the contoured region **410**. The width “W1” is measured along an axis X-X' of the reductant injector mount **200**, wherein the axis X-X' is perpendicular to the axis A-A'. Further, the second lobe **426** of the contoured region **410** has a width “W2”. The width “W2” is measured along the axis X-X' of the reductant injector mount **200**. A ratio “R1” of the width “W1” to the diameter “D” of the cut out portion **412** and a ratio “R2” of the width “W2” to the diameter “D” of the cut out portion **412** are decided such that the velocity of the exhaust gas flow is increased through the contoured region **410** and recirculation of the exhaust gas flow therethrough is reduced. In one embodiment, the ratio “R1” of the width “W1” of the first lobe **424** to the diameter “D” of the cut out portion **412** is approximately from 0.75 to 5. In some embodiments, the ratio “R1” is approximately from 0.75 to 2.5 or 2.5 to 5. In one example, the ratio “R1” may be approximately equal to 2.5.

[0040] In one embodiment of the present disclosure, the width “W1” of the first lobe **424** may be equal to the width “W2” of the second lobe **426**. Therefore, the ratio “R1” may be equal to the ratio “R2”. Accordingly, the ratio “R2” of the width “W2” of the second lobe **426** to the diameter “D” of the cut out portion **412** is approximately from 0.75 to 5. In some embodiments, the ratio “R2” is approximately from 0.75 to 2.5 or 2.5 to 5. In one example, the ratio “R2” may be approximately equal to 2.5. Alternatively, the width “W1” of the first lobe **424** may be different than the width “W2” of the second lobe **426**. In such an example, the ratio “R1” may be different than the ratio “R2”.

[0041] When the reductant injector mount **200** is mounted on the mixing tube **124**, a curved surface of the contoured region **410** of the reductant injector mount **200** faces the exhaust gas flow. The curvature of the contoured region **410** varies along a cross section of the reductant injector mount **200**. Referring to FIG. 5, the first and second lobes **424**, **426** are provided at an angle with respect to the mounting region **402**. An angle of incidence “ α_1 ”, “ α_2 ” of the first and second lobes **424**, **426** respectively are decided such that the exhaust gas flow adapts a streamlined flow in the contoured region **410**. The angle of incidence “ α_1 ” hereinafter is interchangeably referred to as receiving angle “ α_1 ”, and is defined at the upstream end **418** of the contoured region **410** of the reductant injector mount **200**, with respect to the exhaust gas flow direction “F”.

[0042] More particularly, the receiving angle “ α_1 ” is formed by an upstream end **436** of the first lobe **424** with respect to the mounting region **402** of the reductant injector mount **200**. The exhaust gas flow is received on the contoured region **410** of the reductant injector mount **200** at the receiving angle “ α_1 ”. In one embodiment, the angle of incidence “ α_1 ” of the contoured region **410** at the first lobe **424** is approximately from 3° to 45°. In one example, the angle of incidence “ α_1 ” may be approximately 6°. Further, the angle of incidence “ α_2 ” of the contoured region **410** at the second lobe **426** is approximately from 10° to 45°. For example, the angle of incidence “ α_2 ” may be approximately 17°.

[0043] Referring to FIG. 6, the reductant injector mount **200** has a thickness “D1” at a downstream end **432** of the first lobe **424**. The thickness “D1” may be measured from a distance “A” from an axis Y-Y' of the cut out portion **412**. Further, the reductant injector mount **200** has a thickness “D2” at a downstream end **434** of the second lobe **426**. The

depth “D2” may be measured from a distance “B” from the axis Y-Y' of the cut out portion **412**. It should be noted that the distance “A” referred to herein is equal to the distance “B”. Further, a ratio “R3” of the thickness “D1” to the thickness “D2” is approximately from 0.4 to 0.9. In some embodiments, the ratio “R3” is approximately from 0.4 to 0.6 or 0.6 to 0.9. In one example, the ratio “R3” may be approximately equal to 0.7.

[0044] Referring now to FIG. 7, a perspective view of an alternate embodiment of the reductant injector mount **700** is shown. In this embodiment, a circumference of the cut out portion **702** of the contoured region **704** disposed on the mounting region **710** is defined by a tapered region **708**. The tapered region **708** tapers along a thickness “T” of the reductant injector mount **700** towards the outer surface **706** of the reductant injector mount **700**. More particularly, a diameter of the cut out portion **702** decreases along the thickness “T” towards the outer surface **706** of the reductant injector mount **700**, such that a diameter “D” of the cut out portion **702** at the contoured region **704** is greater than a diameter “d” at the outer surface **706** of the reductant injector mount **700**. It should be noted that the design and shape of the contoured region **410**, **704** and thus the reductant injector mount **200**, **700** is not limited to the exemplary illustrations in FIGS. 4-7 and may vary therefrom.

[0045] FIG. 8 illustrates another reductant injector mount **800**, according to one embodiment of the present disclosure. As illustrated, the contoured region **802** is formed in the mounting region **810** of the reductant injector mount **800** may have an approximately oblong shape, with curved sections **814**, **816** provided at either ends along the axis Z-Z'. In this embodiment, a width “W3” of the contoured region **802** is uniform along the axis Z-Z' of the reductant injector mount **800**.

[0046] As discussed earlier, based on system requirements, the reductant injector mounts **202** may be positioned angularly on the mixing tube **124** with respect to the exhaust gas flow direction “F” (see FIG. 3). Referring to FIG. 9, accordingly the contoured region **902** is formed in the mounting region **904** of such reductant injector mounts **202** are oriented so that the contoured region **902** is aligned with respect to the exhaust gas flow direction “F”, when the reductant injector mount **202** is fitted onto the mixing tube **124**. An axis F-F' defined by the contoured region **902** is parallel to the exhaust gas flow direction “F”. More particularly, the axis F-F' of the contoured region **902** is angled with respect to the axis Z-Z', so that the contoured region **902** is aligned with the exhaust gas flow direction “F”. It should be noted that the design of the contoured region **902** shown in FIG. 9 is exemplary, and may include any other design, such as that explained in FIGS. 4-7, without limiting the scope of the present disclosure.

INDUSTRIAL APPLICABILITY

[0047] Flow field around an injection location of the reductant injector mounted on the mixing tube may have unfavorable recirculating and/or low velocity patterns of the exhaust gas flow. This may create/increase formation of urea deposits that may be present in the reductant. Such urea deposition can prevent/hinder the reductant spray pattern/interaction with the exhaust gas flow and further cause deposition issues and reduce NOx conversion in the aftertreatment system.

[0048] FIG. 10 is a flowchart for a method **1000** for controlling exhaust gas flow in the conduit **123**. At step **1002**, the reductant injector **128** is received through the mounting

region **402, 710, 810, 904** of the reductant injector mount **200, 202, 700, 800**. At step **1004**, the exhaust gas flows over the contoured region **410, 704, 802, 902** of the reductant injector mount **200, 202, 700, 800**. At step **1006**, based on the flow, the velocity of the exhaust gas flow increases through the contoured region **410, 704, 802, 902**. Further, the exhaust gas flow is received at the receiving angle " α_1 ".

[0049] At step **1008**, based on the flow, the recirculation of the exhaust gas flow flowing through the contoured region **410, 704, 802, 902** is reduced. The exhaust gas flow is then discharged towards the SCR module **138** provided downstream of the conduit **123**. The flow field provided by the contoured region **410, 704, 802, 902** of the reductant injector mount **200, 202, 700, 800** has reduced or no recirculation around the reductant injector tip **416** and also increases the velocity near the injection location.

[0050] Accordingly, the deposit formation of the reductant around the reductant injector tip **416** may reduce or be eliminated because of reduced recirculation and increased velocity of the exhaust gas flow through the reductant injector mount **200, 202, 700, 800**. Further, the reductant may uniformly mix with the exhaust gas flow and an improved NOx conversion may take place in the aftertreatment system **114**. Also, servicing and maintenance associated with removal of the reductant deposits close to the reductant injector **128** may be reduced, thereby decreasing cost associated with servicing and maintenance cost of the aftertreatment system **114**.

[0051] While aspects of the present disclosure have been particularly shown and described with reference to the embodiments above, it will be understood by those skilled in the art that various additional embodiments may be contemplated by the modification of the disclosed machines, systems and methods without departing from the spirit and scope of what is disclosed. Such embodiments should be understood to fall within the scope of the present disclosure as determined based upon the claims and any equivalents thereof.

What is claimed is:

1. A reductant injector mount comprising:
 - a mounting region configured to connect to an exhaust conduit;
 - a contoured region formed in the mounting region, the contoured region configured to:
 - increase a velocity of an exhaust gas flow through the contoured region; and
 - reduce a recirculation of the exhaust gas flow through the contoured region; and
 - a cut out portion provided on the contoured region, the cut out portion configured to receive a reductant injector tip therethrough.
2. The reductant injector mount of claim 1, wherein the contoured region includes a first lobe and a second lobe provided on either side of the cut out portion, wherein the first lobe is positioned at a location upstream of the cut out portion and the second lobe is positioned downstream of the cut out portion, with respect to an exhaust gas flow direction.
3. The reductant injector mount of claim 2, wherein the cut out portion is positioned in a throat portion of the contoured region, the throat portion connecting the first and second lobes of the contoured region.
4. The reductant injector mount of claim 2, wherein a ratio of a width of the first lobe with respect to a diameter of the cut out portion is from 0.75 to 5, wherein the width of the first lobe is measured along an axis of the reductant injector mount perpendicular to the exhaust gas flow direction.

5. The reductant injector mount of claim 2, wherein a ratio of a width of the second lobe with respect to a diameter of the cut out portion is from 0.75 to 5, wherein the width of the first lobe is measured along an axis of the reductant injector mount perpendicular to the exhaust gas flow direction.

6. The reductant injector mount of claim 2, wherein a ratio of a thickness of the reductant injector mount at a downstream end of the first lobe with respect to a thickness of the reductant injector mount at a downstream end of the second lobe is from 0.4 to 0.9, with respect to the exhaust gas flow direction.

7. The reductant injector mount of claim 2, wherein an angle of incidence of the contoured region at the first lobe is from 3° to 45°, wherein the angle of incidence is defined by the angle formed by the upstream end of the first lobe with respect to the mounting region of the reductant injector mount.

8. The reductant injector mount of claim 1 further comprising receiving elements projecting from the mounting region, the receiving elements configured to connect to a reductant injector.

9. The reductant injector mount of claim 1, wherein the contoured region has an oblong shape.

10. The reductant injector mount of claim 1, wherein a circumference of the cut out portion tapers along a thickness of the reductant injector mount.

11. The reductant injector mount of claim 1, wherein an orientation of the contoured region provided on the mounting region is aligned with respect to an exhaust gas flow direction.

12. The reductant injector mount of claim 1, wherein the cut out portion is positioned closer to a downstream end of the contoured region with respect to the exhaust gas flow direction as compared to an upstream end of the contoured region.

13. An aftertreatment system comprising:

- an exhaust conduit having a cut out region provided thereon;
- a selective catalytic reduction module coupled to the exhaust conduit;
- a reductant injector mount received into the cut out region provided on the exhaust conduit, the reductant injector mount positioned upstream of the selective catalytic reduction module with respect to an exhaust gas flow, the reductant injector mount comprising:
 - a mounting region connected to the exhaust conduit;
 - a contoured region formed in the mounting region, the contoured region facing an inner side of the exhaust conduit, the contoured region being configured to:
 - increase a velocity of the exhaust gas flow through the contoured region; and
 - reduce a recirculation of the exhaust gas flow through the contoured region; and
 - a cut out portion provided on the contoured region; and
- a reductant injector in fluid communication with the exhaust conduit, wherein the reductant injector mount is received through the cut out portion provided on the reductant injector mount.

14. The aftertreatment system of claim 13, wherein the reductant injector mount is attached to a top portion of the exhaust conduit.

15. The aftertreatment system of claim 13, wherein the reductant injector mount is disposed in a direction parallel to a direction of the exhaust gas flow.

16. The aftertreatment system of claim 13, wherein the reductant injector mount is disposed in a direction angular to a direction of the exhaust gas flow.

17. The aftertreatment system of claim **13**, wherein the reductant injector mount further comprises receiving elements projecting into an interior space of the exhaust conduit from the mounting region, the receiving elements configured to receive mechanical fasteners associated with the reductant injector.

18. A method of controlling exhaust gas flow in an exhaust conduit, the method comprising:

- receiving a reductant injector through a mounting region of a reductant injector mount;
- flowing an exhaust gas flow on a contoured region of the reductant injector mount;
- increasing a velocity of the exhaust gas flow through the contoured region based on the flow; and
- reducing a recirculation of the exhaust gas flow through the contoured region based on the flow.

19. The method of claim **18**, wherein the flowing step further comprises receiving the exhaust gas flow at an angle of incidence defined at an upstream end of the contoured region of the reductant injector mount with respect to a direction of flow of the exhaust gas, wherein the angle of incidence is defined by the angle formed by contoured region with respect to the mounting region of the reductant injector mount.

20. The method of claim **18** further comprising discharging the exhaust gas flow towards a selective catalytic reduction module.

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