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(54) **EXHAUST STACK**

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(57) **ABSTRACT**

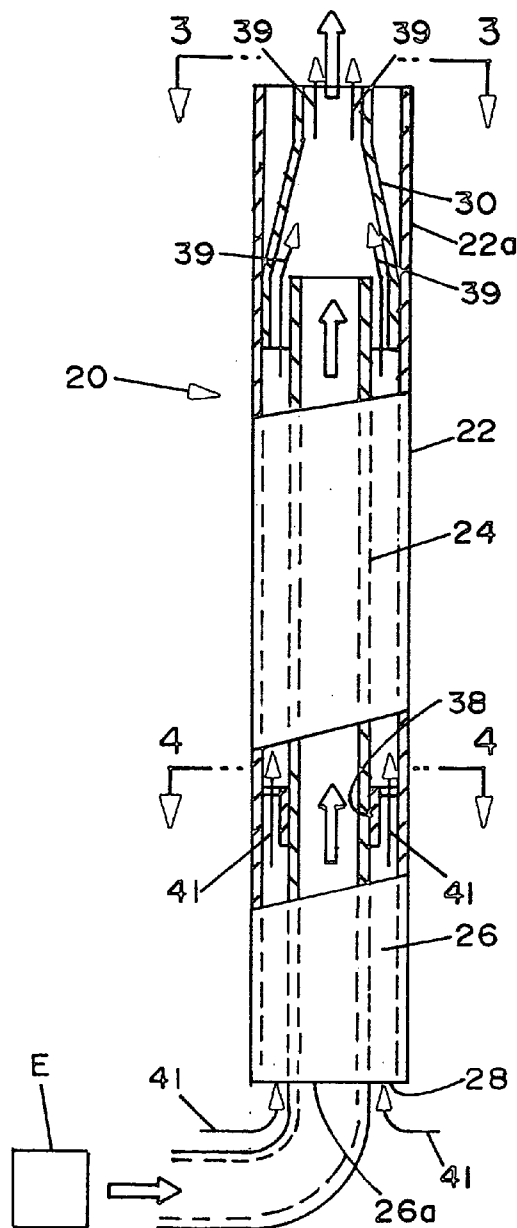
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An improved exhaust stack for use with commercial vehicles such as semi-truck tractors. The improved exhaust stack includes an outer tubular portion that, if desired, can be chrome plated; an inner tubular portion that is coaxially aligned with the outer tubular portion and cooperates there with to define an annular shaped flow passageway; and a venturi tube section mounted within the upper extremity of the outer tubular portion, the venturi tube section being in communication with the inner tubular portion and with the annular shaped flow passageway.

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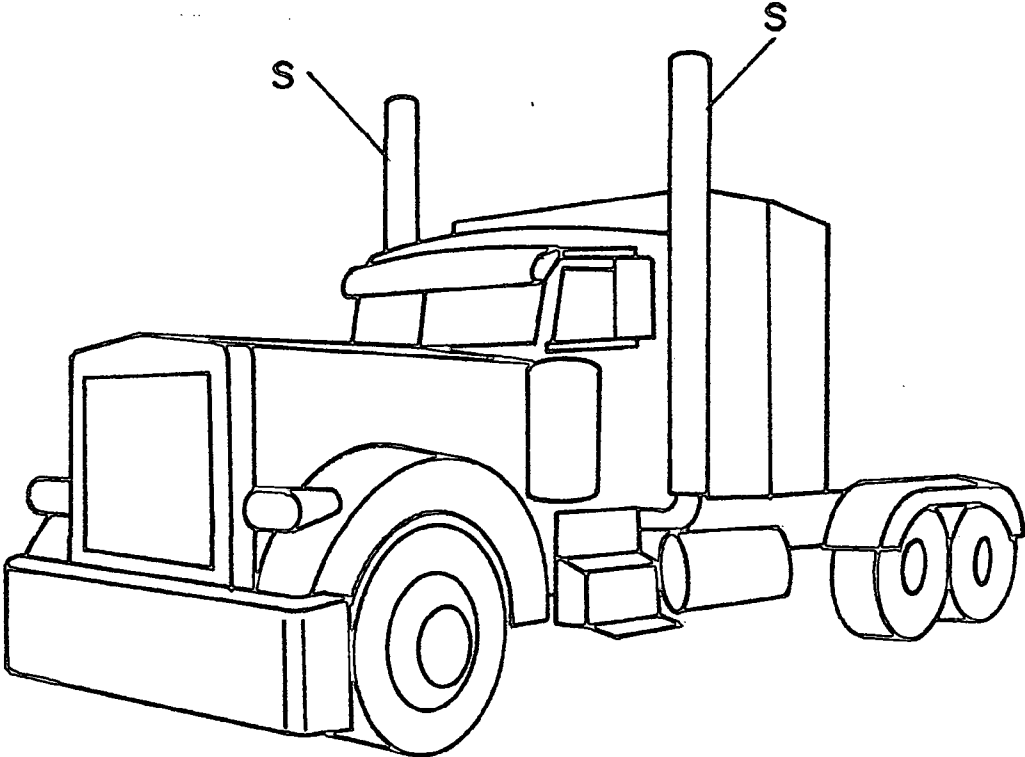


FIG.1  
(PRIORART)

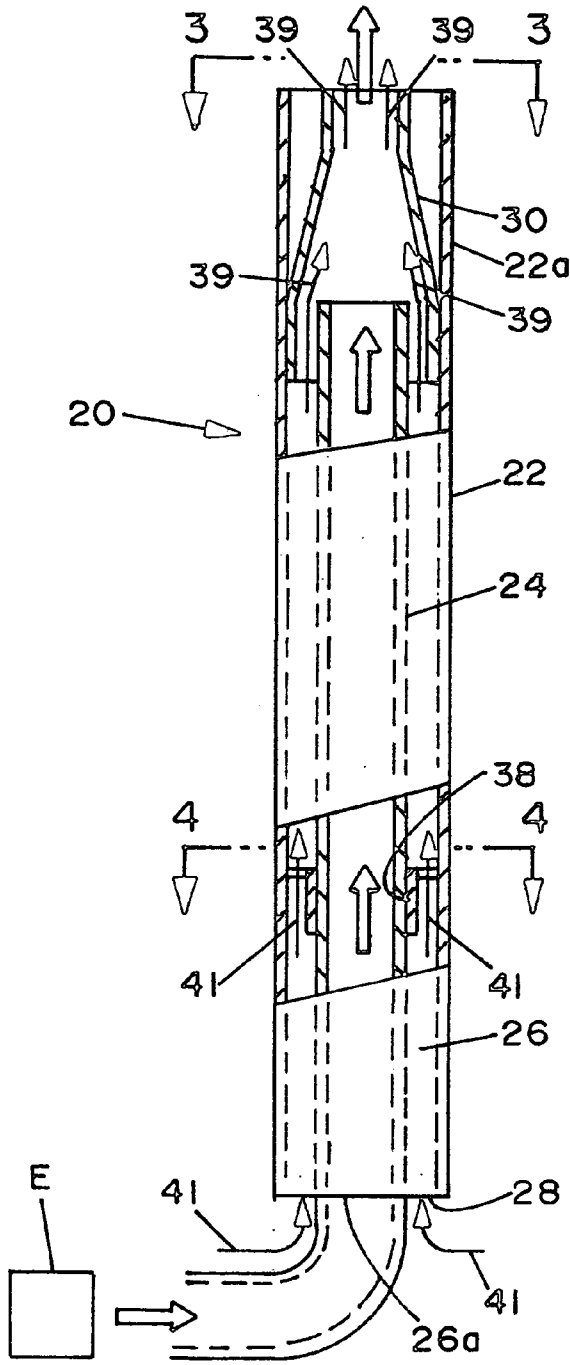


FIG. 2

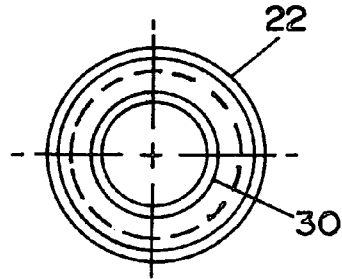


FIG. 3

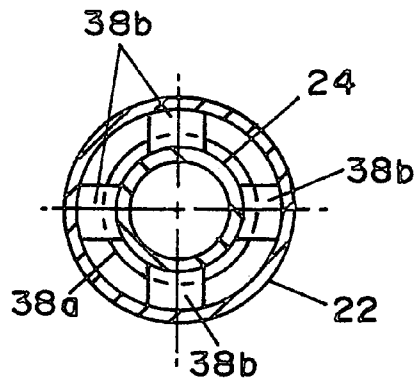


FIG. 4

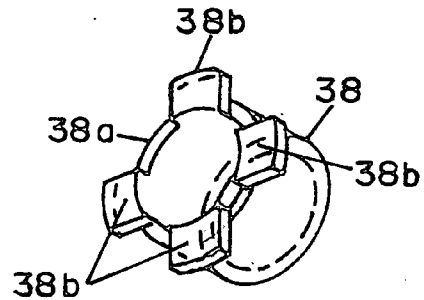
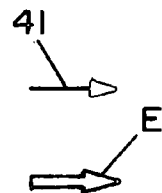


FIG. 5



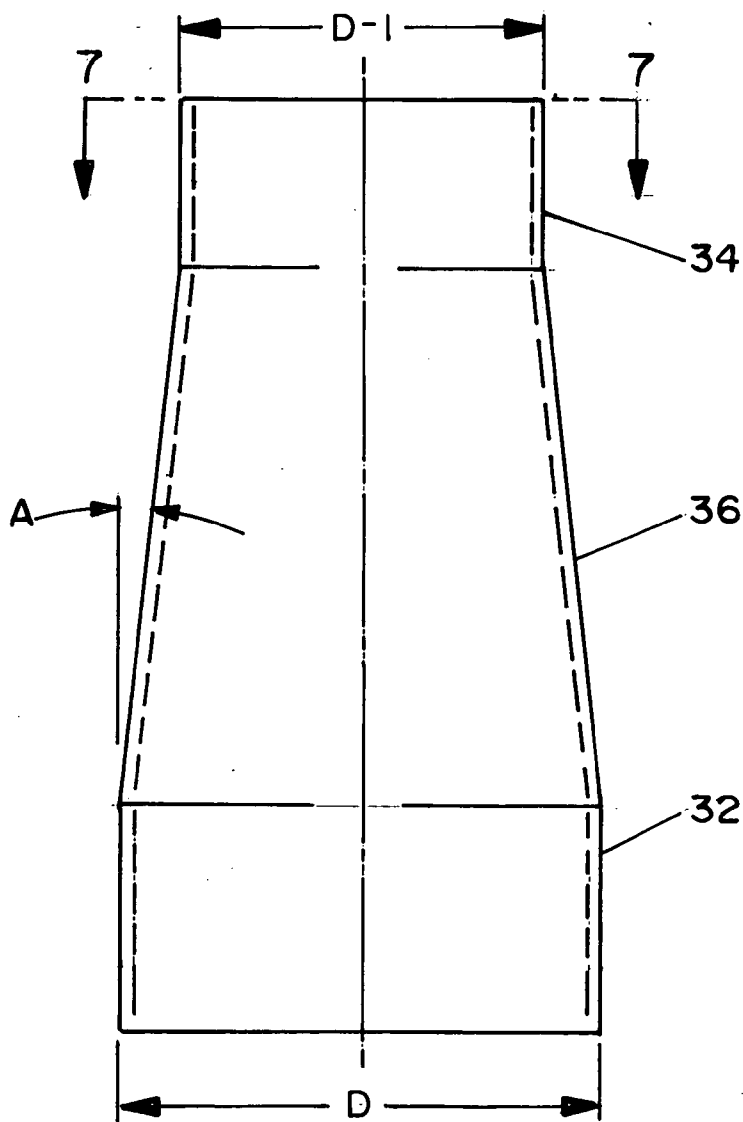
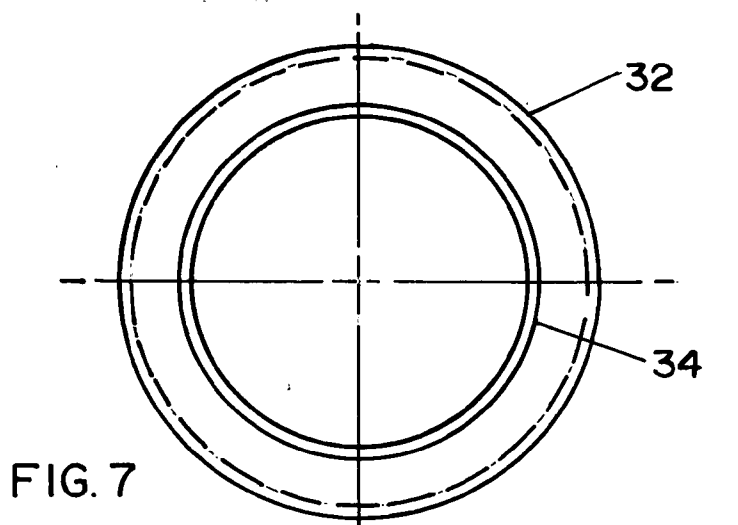


FIG. 6

**EXHAUST STACK**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] Not Applicable

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

[0002] Not Applicable

**INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC**

[0003] Not Applicable

**BACKGROUND OF THE INVENTION**

[0004] 1. Field of the Invention

[0005] The present invention relates generally to vehicle exhaust systems. More particularly, the invention concerns an improved exhaust stack for use with commercial vehicles, such as semi-truck tractors.

[0006] 2. Description of Related Art Including Information Disclosed Under 37 CRF 1.97 and 1.98

[0007] In recent years, elongated, vertically extending, chrome plated exhaust stacks have become very popular with truckers particularly for use with commercial semi-truck tractors. While the chrome plated exhaust stacks are quite attractive, when the vehicle exhaust system includes a catalytic converter, and after the engine has been run for a relatively short period of time, the exterior surface of the exhaust stack becomes extremely hot thereby constituting an undesirable safety hazard. The thrust of the present invention is to provide a novel improved vehicle stack that uniquely addresses this prior art stack heating problem.

**BRIEF SUMMARY OF THE INVENTION**

[0008] By way of brief summary, the improved exhaust stack of the present invention comprises an outer tubular portion that, if desired, can be chrome plated; an inner tubular portion that is coaxially aligned with the outer tubular portion and cooperates therewith to define an annular shaped flow passageway; and a venturi tube section mounted within the upper extremity of the outer tubular portion, the venturi tube section being in communication with the inner tubular portion and with the annular shaped flow passageway.

**BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS**

[0009] FIG. 1 is a generally perspective view of a prior art truck tractor having a pair of vertically extending exhaust stacks connected thereto.

[0010] FIG. 2 is a longitudinal cross-sectional view of one form of the improved exhaust stack of the present invention shown interconnected with the exhaust manifold of the truck.

[0011] FIG. 3 is a view taken along lines 3-3 of FIG. 2.

[0012] FIG. 4 is a cross-sectional view taken along lines 4-4 of FIG. 2.

[0013] FIG. 5 is a generally perspective view of one form of the centering ring of the invention for centering the exhaust tube component of the improved exhaust stack that is interconnected with the exhaust manifold of the truck.

[0014] FIG. 6 is a longitudinal cross-sectional view of one form of the venturi tube component of the improved exhaust stack of the invention.

[0015] FIG. 7 is a view taken along lines 7-7 of FIG. 6.

**DETAILED DESCRIPTION OF THE INVENTION**

[0016] Referring to FIG. 1 of the drawings, there is illustrated a conventional prior art semi-truck tractor having a pair of exhaust stacks "S" mounted thereon and interconnected with the engine exhaust of the tractor in a conventional manner. As previously mentioned, the outer surfaces of the prior art exhaust stacks, which are often chrome plated, undesirably become extremely hot after the engine is run for even a short period of time. FIG. 2 is a cross-sectional view of one form of the improved exhaust stack of the invention that can be mounted on a conventional semi-truck tractor in the manner illustrated in FIG. 1 of the drawings. As will be discussed in greater detail in the paragraphs which follow, because of the unique design of the improved exhaust stack of the invention, the exterior surface of the stack is only warm to the touch even after the truck has been operated for a long period of time.

[0017] Referring particularly to FIG. 2 of the drawings, the improved exhaust stack of the invention, which is there designated by the numeral 20, comprises an outer tubular portion 22 having an upper extremity 22a and an inner tubular portion 24 that is disposed within outer tubular portion 22 and in coaxial alignment therewith. Tubular portion 24 cooperates with outer tubular portion 22 to define an annular shaped flow passageway 26 having an inlet port 28 that is in communication with atmosphere.

[0018] Mounted within outer tubular portion 22 proximate the upper extremity thereof is a uniquely configured tapered tube, or venturi component 30. As best seen by referring to FIG. 6 of the drawings, tapered tube 30 has a generally cylindrically shaped inlet section 32 of a first diameter "D" and a generally cylindrically shaped outlet section 34 of a second lesser diameter "D-1". A tapered wall 36 interconnects the inlet and outlet sections in the manner illustrated in FIG. 6 of the drawings. Inlet section 32 has an exterior wall 32a and the tapered wall 36 of the tapered tube 30 extends at an angle "A" relative to the plane of exterior wall 32a. Angle "A" can vary depending upon the end use of the particular improved exhaust stack, but for typical applications is between about four and about eight degrees.

[0019] To maintain the inner tube 24 centered with respect to outer tube 22, a centering ring 38 of the construction illustrated in FIGS. 4 and 5 of the drawings is disposed within the outer tubular portion 22 the manner shown in FIG. 2 of the drawings. Centering ring 38 includes a central body portion 38a that engages the inner tubular portion 24 and a plurality of radially outwardly extending fingers 38b that engage the interior wall of outer tubular member 22. Centering ring 38 can be constructed from a suitable metal or ceramic material of a character well understood by those skilled in the art.

[0020] In using the improved exhaust stack of the invention, the exhaust stack is mounted to the truck trailer in the manner illustrated in FIG. 1 of the drawings and the inlet 26a of the inner tube 26 is interconnected with the engine exhaust "E" in the manner illustrated in FIG. 2 of the drawings. As indicated in FIG. 2, the engine exhaust flows through the inner tube 26 and outwardly into the venturi component 30 in the manner indicated by the arrows 39 of FIG. 2. As the engine exhaust flows through the center component 30, the resulting

venturi action will cause cool air to be drawn from atmosphere into the flow passageway **26** and past the exterior of the inner tube in the manner illustrated by the arrows **41** in FIG. **2**. This continuous flow of cool air past the exterior of the inner tube **24** will efficiently dissipate the heat from the exterior surface of the inner tube thereby causing the exterior surface of the outer tube **22** to be at a significantly lower temperature and then only warm to the touch. More particularly, actual tests have shown that typically the exhaust gases from a 175 horsepower diesel engine running at about 2000 RPM enter the stack at a temperature of about 600° F. and exit the stack at a temperature of about 550° F. When the stacks of the present invention are used and after the truck has been run for about 1½ hours, the outside surface temperature of the stacks has been measured at about 98-100° F.

[0021] Having now described the invention in detail in accordance with the requirements of the patent statutes, those skilled in this art will have no difficulty in making changes and modifications in the individual parts or their relative assembly in order to meet specific requirements or conditions. Such changes and modifications may be made without departing from the scope and spirit of the invention, as set forth in the following claims.

**1.** An improved exhaust stack for use with a vehicle having an engine exhaust, comprising:

- (a) an outer tubular portion having an upper extremity;
- (b) an inner tubular portion having an inlet in communication with the engine exhaust, said inner tubular portion being disposed within said outer tubular portion and cooperating therewith to define an annular shaped flow passageway; and
- (c) a venturi tube mounted within said outer tubular portion and being in communication with said annular shaped flow passageway and with said inner tubular portion.

**2.** The improved exhaust stack as defined in claim **1** in which said venturi tube is mounted proximate said upper extremity of said outer tubular portion.

**3.** The improved exhaust stack as defined in claim **1** in which said inner tubular portion has an outlet in communication with atmosphere and in which said annular shaped flow passageway is in communication with atmosphere.

**4.** The improved exhaust stack as defined in claim **1** in which said venturi tube has an inlet of a first diameter, an outlet of a second lesser diameter and a tapered wall interconnecting said inlet and said outlet.

**5.** An improved exhaust stack for use with a vehicle having an engine exhaust, comprising:

- (a) an outer tubular portion having an upper extremity;
- (b) an inner tubular portion disposed within said outer tubular portion and cooperating therewith to define an annular shaped flow passageway having an air inlet port; and
- (c) a tapered tube mounted within said outer tubular portion proximate the upper extremity thereof, said tapered tube having an inlet section of a first diameter, an outlet section of a second lesser diameter and a tapered wall interconnecting said inlet section and said outlet section.

**6.** The improved exhaust stack as defined in claim **5** in which said inner tubular portion is coaxially aligned with said outer tubular portion.

**7.** The improved exhaust stack as defined in claim **5** further including a centering ring disposed within said outer tubular portion and disposed in engagement with said inner tubular portion.

**8.** The improved exhaust stack as defined in claim **5** in which said inlet and outlet sections of said tapered tube are generally cylindrical.

**9.** The improved exhaust stack as defined in claim **5** in which said tapered wall of said tapered tube extends at an angle of between four and eight degrees with respect to vertical.

**10.** An improved exhaust stack for use with a vehicle having an engine exhaust, comprising:

- (a) an outer tubular portion having an upper extremity;
- (b) an inner tubular portion disposed within said outer tubular portion and cooperating therewith to define an annular shaped flow passageway having an inlet port in communication with atmosphere, said inner tubular portion being coaxially aligned with said outer tubular portion;
- (c) a tapered tube mounted within said outer tubular portion proximate the upper extremity thereof, said tapered tube having a generally cylindrically shaped inlet section of a first diameter, a generally cylindrically shaped outlet section of a second lesser diameter and a tapered wall interconnecting said inlet and said outlet sections, said tapered wall extending at an angle of between about four and about eight degrees with respect to vertical; and
- (d) a centering ring disposed within said outer tubular portion and in engagement with said inner tubular portion for centering said inner tubular portion.

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