April 3, 1934. C. A. MILLER 1,953,120

EXHAUST GAS PURIFIER FOR VEHICLES

Filed Dec. 20, 1932

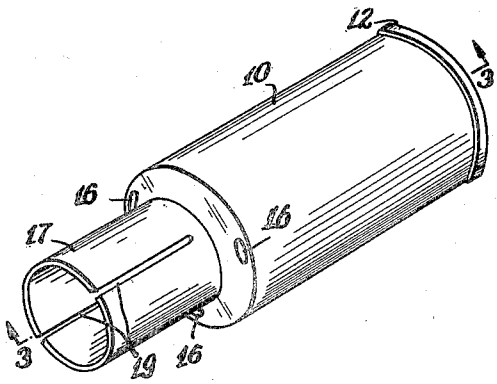


Fig. 1.

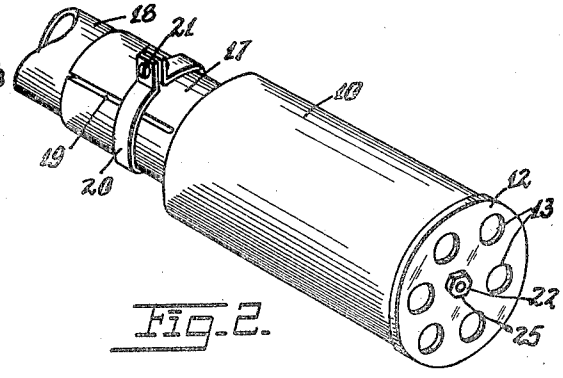


Fig. 2.

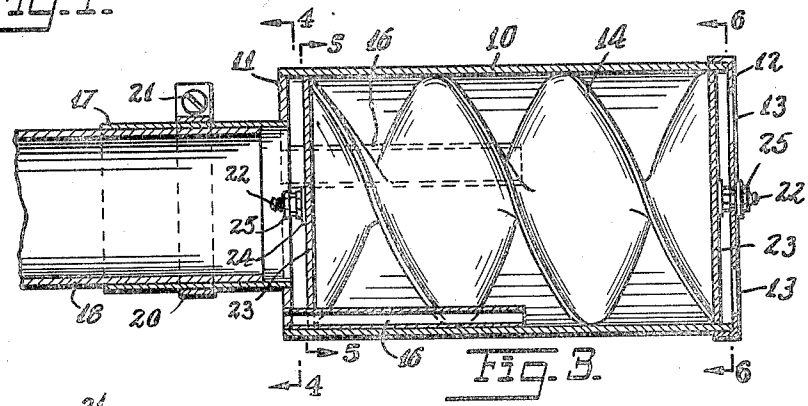


Fig. 3.

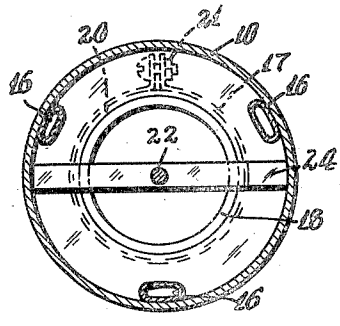


Fig. 4.

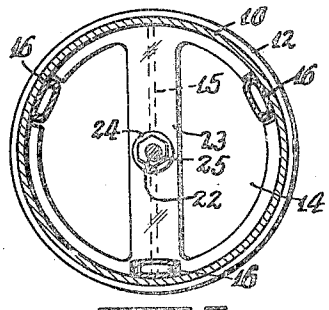


Fig. 5.

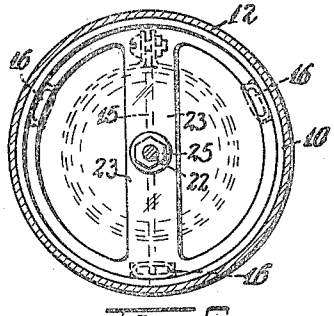


Fig. 6.

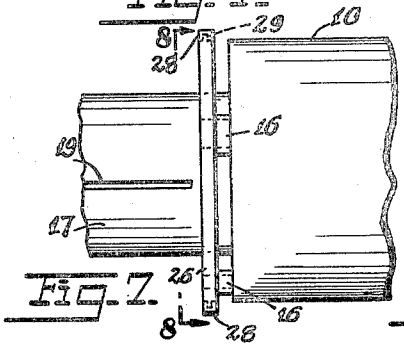


Fig. 7.

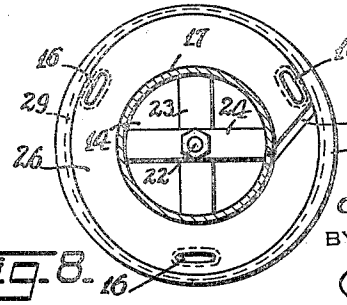


Fig. 8.

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EXHAUST GAS PURIFIER FOR VEHICLES

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8 Claims. (Cl. 23—288)

This invention relates to new and useful improvements in an exhaust gas purifier for vehicles.

The invention has for an object the construction of an article as mentioned which is characterized by a tubular casing associated with means for permitting the entrance of air and the escape of gas in a manner so that the air mixes with the gas and thus reduces the concentration of the carbon monoxide within the gas.

It is a still further object of this invention to arrange a worm spiral within the casing in a manner so as to facilitate the mixing of the gas and air.

Still further the invention proposes a novel arrangement for connecting the tubular casing upon the exhaust of an engine.

As another object of this invention an arrangement is proposed whereby the entrance of air within the tubular casing can be adjusted in a manner so as to prevent back pressure from causing the gases to escape from the air openings and simultaneously providing for the most efficient mixing of the gas and air.

Still further the invention contemplates the construction of an article as mentioned which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:—

Fig. 1 is a perspective view of an article constructed according to this invention.

Fig. 2 is a perspective view of Fig. 1 seen from the front end and shown provided with a clamp.

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary side elevational view of the device constructed according to a modified form.

Fig. 8 is a transverse vertical sectional view taken on the line 8—8 of Fig. 7.

The exhaust gas purifier for vehicles according to this invention comprises a tubular casing 10 having a closed rear end 11 and an opened front end closed by a cover 12 formed with a plurality of openings 13 for the discharging of the gas. A helical worm 14 is extended throughout the entire length of the tubular casing. This helical worm is of a shape as would be obtained by taking a flat strip of material and twisting it around its longitudinal center as an axis forming the necessary turns. Therefore, the worm will have diametric edges 15 at each end. A plurality of air tubes 16 extend in from the rear end 11 of the tubular casing to a distance substantially half way the complete length of the tubular casing, the object being to mix the air with the gases as the gases are traveling in a helical path.

A tubular inlet 17 is fixed upon the rear end 11 of the tubular casing and is adapted for attachment upon the exhaust pipe of an engine. Reference numeral 18 indicates the exhaust pipe and it should be noticed that the tubular inlet 17 engages over the end thereof. Several longitudinal slots 19 are formed in the tubular inlet 17 so that the inlet may be clamped tightly upon the exhaust pipe. For this purpose a band 20 encircles the tubular inlet 17 and is adapted to be clamped by the provision of a screw 21 engaging through the ends of the band.

Preferably the tubular casing 10 should be made of copper and the worm of aluminum so as to oxidize the carbon-monoxide to carbon-dioxide. A central pin 22 projects from each of the ends 15 of the helical worm and engages through standards 23 supported within the ends of the tubular casing 10. At the gas entrance end of the tubular casing 10 there is also provided a diagonally supported strip 24 serving to aid in the proper supporting of the helical worm. Nuts 25 engage upon the outer ends of the pins 22 and conclude the attachment of the worm upon the standards. Furthermore, the air tubes 16 pass through cutout portions in the helical worm 14 and so serve to absolutely hold the helical worm against any possible rotation.

In Figs. 7 and 8, a modified form of the invention has been disclosed in which a ring 26 is slidably arranged upon the tubular inlet 17 and from which the plurality of air tubes 16 project. These tubes extend into the rear end of the tubular casing 10 and discharge in the helical path formed by the worm, shown in detail in the previous figures. The ring 26 is formed with a cut 27 in one side so that it may be readily clamped to maintain positions upon the tubular inlet 17. A clamping ring 28 is rotatively engaged upon the ring 26 by reason of a flange 29 on one of the rings engaging into a corresponding groove in the other of the rings. The outer diameter of the ring 26 and the inner diameter of the clamping ring 28 are identical but not truly circular, being of slightly elliptical or other similar form. Therefore, when the major axes are in line with each other the ring 26 will not be pressed against the exterior of the tubular inlet 17 but when the clamping ring 28 is turned, then the inner ring 26

will be tightly pressed closed, thus clamping the air tubes 16 in fixed positions.

The operation of the device may be traced by assuming the exhaust gases of a motor to be entering the tubular casing 10 through the exhaust pipe 13. These fumes will be caused to travel in a helical path following the contour of the worm 14. These fumes in their travel pass the inner ends of the air tubes 16 and will draw in air and cause a reduction of pressure at the ends of the tubes due to the moving gases in accordance with Bernoulli's principle. The air will mix with the gas and so dilute the carbon monoxide or other poisonous gas within the exhaust. The gases and air in their mixed condition will discharge through the openings 13.

While I have shown and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:—

1. An exhaust gas purifier for motor vehicles and the like, comprising a tubular casing having a closed rear end and a front end with a plurality of openings for the discharge of gases, a helical worm stationary within said tubular casing, a plurality of air tubes extended in from the closed rear end of said tubular casing to a position near the worm so as to cause air to be drawn therethrough, and a tubular inlet upon the rear of said tubular casing adapted for connection upon the exhaust pipe of one of said vehicles.

2. An exhaust gas purifier for motor vehicles and the like, comprising a tubular casing having a closed rear end and a front end with a plurality of openings for the discharge of gases, a helical worm stationary within said tubular casing, a plurality of air tubes extended in from the closed rear end of said tubular casing to a position necessary in the vicinity of the worm where the pressure is below atmospheric pressure so as to cause air to be drawn in for supplying air to the gases passing through the turns of said worm, and a tubular inlet upon the rear of said tubular casing adapted for connection upon the exhaust pipe of one of said vehicles.

3. An exhaust gas purifier for motor vehicles and the like, comprising a tubular casing having a closed rear end and a front end with a plurality of openings for the discharge of gases, a helical worm stationary within said tubular casing, a plurality of air tubes extended in from the closed rear end of said tubular casing to a position for supplying air to the gases passing through the turns of said worm, and a tubular inlet upon the rear of said tubular casing adapted for connection upon the exhaust pipe of one of said vehicles, said air tubes passing through peripheral cuts in the turns of said helical worm and serving to hold the worm in its stationary position.

4. An exhaust gas purifier for motor vehicles and the like, comprising a tubular casing having a closed rear end and a front end with a plurality of openings for the discharge of gases, a helical worm stationary within said tubular casing, a plurality of air tubes extended in from the closed rear end of said tubular casing to a position for supplying air to the gases passing through the turns of said worm spiral, a tubular inlet upon the rear of said tubular casing adapted for connection upon the exhaust pipe of one of said vehicles, and standards within said tubular casing supporting the ends of said worm.

5. An exhaust gas purifier for vehicles, comprising a tubular casing with a closed rear end and an opened front end, a helical worm stationary within said tubular casing, a tubular inlet on the rear end of said casing, a plurality of air tubes slidably extending into the rear end of the tubular casing and extending into the vicinity of the helical worm, and means for holding the air tubes in various fixed positions rendering the relative position between the worm and the air tubes adjustable.

6. An exhaust gas purifier for vehicles, comprising a tubular casing with a closed rear end and an opened front end, a helical worm stationary within said tubular casing, a tubular inlet on the rear end of said casing, a plurality of air tubes slidably extending into the rear end of the tubular casing and extending into the vicinity of the helical worm, and means for holding the air tubes in various fixed positions rendering the relative position between the worm and the air tubes adjustable, comprising a ring slidably mounted upon said tubular inlet and carrying said air tubes, and means for holding said ring in various fixed positions upon said tubular inlet.

7. An exhaust gas purifier for vehicles, comprising a tubular casing with a closed rear end and an opened front end, a helical worm stationary within said tubular casing, a tubular inlet on the rear end of said casing, a plurality of air tubes slidably extending into the rear end of the tubular casing and extending into the vicinity of the helical worm, and means for holding the air tubes in various fixed positions rendering the relative position between the worm and the air tubes adjustable, comprising a ring slidably mounted upon said tubular inlet and carrying said air tubes, and means for holding said ring in various fixed positions upon said tubular inlet, comprising a clamp ring rotative upon said ring, and said ring being formed with a slot.

8. An exhaust gas purifier for vehicles, comprising a tubular casing with a closed rear end and an opened front end, a helical worm stationary within said tubular casing, a tubular inlet on the rear end of said casing, a plurality of air tubes slidably extending into the rear end of the tubular casing and extending into the vicinity of the helical worm, and means for holding the air tubes in various fixed positions rendering the relative position between the worm and the air tubes adjustable, comprising a ring slidably mounted upon said tubular inlet and carrying said air tubes, and means for holding said ring in various fixed positions upon said tubular inlet, comprising a clamp ring rotative upon said ring, and said ring being formed with a slot, said contacting faces of both rings being slightly elliptical providing for said clamping.

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