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TITLE: An Axial Flow Air Guiding System (Device) to improve the internal combustion engine.

The present invention relates to an air guiding device for use in combination with an internal combustion engine to create avortical and/or turbulent air flow in axial flow in the air entering a manifold.

Combustion engines requires a mixture of air and fuel to be delivered to the engine for combustion purposes. Air is delivered to the inlet manifold through an air filter and the filtered air is mixed with the fuel in the carburettor or fuel injection unit which supplies a fines stream of fuel droplets for mixing with a steady air stream which is drawn by the low pressure present in the carburettor during each induction stroke of each respective cylinder in an engine. However, because the air flow to and through the carburettor or fuel injection unit is generally laminar and non-vortical there is little opportunity for the fuel droplets to mix efficiently with the air to provide a homogeneous fuel-air mixture for optimum combustion characteristic.

At high air flow rates, i.e.. when a throttle of the engine is fully open, some turbulence may be caused naturally which aids the mixing process. However, at low air flow rates there is little mixing of fuel and air due to the low energy of the air flow.

It is an object of the present invention to improve the mixing process at low air flow rates in axial flow with less energy consumption to create such vortical and/or turbulent air flow by the vanes and/or the tab or tabs. It is also has little air flow blockage at high air flow rate that might view as a disadvantage of using radial flow air guiding device.

Accordingly, one aspect of the present invention provides an air guiding device for producing a vortical and/or turbulent air flow in axial flow in an inlet manifold, which device comprises a fixed supporting structure, a plurality of vanes carried by the supporting structure for deflecting an air flow impinging on the device in a first direction, a tab associated with at least one of the vanes for deflection the air flow in a second direction, the arrangement being such that the air flow impinging on the device in axial flow is deflected into vortical and/or turbulent air flow by the vanes and/or the tab or tabs.

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The present invention provides an air guiding device for producing a vortical and/or turbulent air flow in axial flow in an inlet manifold. The present inventions need less energy to create the same amount of vortical and/or turbulent air flow by the vanes and/or the tab or tabs compare with radial flow air guiding device . Hence, to create same amount of vortical and/or turbulent air flow, the axial flow an air guiding device uses less and/or smaller vanes and/or the tab or tabs.

Due to consume less energy to create vortical and/or turbulent air flow by the vanes and/or the tab or tabs, the axial flow an air guiding device is able to maximises the efficiency of vortical and/or turbulent air flow by the vanes and/or the tab or tabs. It is a solution to radial flow air guiding device that it might become an air flow blockage at high air flow rate.

So the present invention may be more readily understood, embodiments thereof will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a perspective view of a first embodiment of an air guiding device according to the present invention for located in air hose:

Figure 2 is a perspective view of a second embodiment of an air guiding device according to the present invention for located in annular air filter:

Figure 3 is a schematic cross-sectional view of an internal combustion engine which includes an air filter incorporating an air guiding device embodying the present invention and carburettor leading to an inlet manifold of a cylinder of the combustion engine:

Figure 4 is a schematic cross-sectional view of an internal combustion engine which includes an air hose connect between an air filterhousing and air inlet manifold. An air guiding device embodying the present invention is located in the air hose leading to an inlet manifold of a cylinder of the combustion engine:

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Figure 5 is a perspective view showing the air guiding device of Figure 2 installed within an annular filter element of an air filter;

Figure 6 shows a view from top of the air guiding device of Figure 1& 2.

Referring to Figure 1, an air guiding device embodying the invention comprises a cylindrical plate 2 formed with vane's supporting lap 5 which angle to axial (air flow direction) with about 25^0 . The vanes 4 were welded on supporting lap 5 that formed with axial at same angle 25^0. The vanes will extend from the cylindrical plate 2 to the axial and meet each other at axial portion and form a rigid structure. At the air exiting part of vane, in this case is at the bottom part of present design, the edge of the vane has extend with a tab which form an angle with vane at about 155^0 at higher pressure side. In the embodiment shown in Figure 1, the tab 6 is of a generally triangular shape, although this tab 6 may , of course, have any suitable shape as may the vane 4. The air guiding device of Figure 1 is shown with three vanes 4 and tabs 6, but other embodiments can be formed with more, or fewer, vanes 4 and tabs 6.

The air guiding device 1 of Figure 1 is cut and formed from a thin metal sheet, although the device could be made in other ways, such as by moulding or casting the device.

This air guiding device will normally fixed in the air hose which located between air filter and inlet manifold.

Referring to Figure 2, an air guiding device embodying the same invention as mentioned in Figure 1 except it cut with the notch 8'. A notch 8' is cut on the vane at the axial side. The notch of each vane will form a hole 3' to allow air filter enclosure tightening bolt 10 (in Figure 5) slide through it for fixing on the annular air filter housing .

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As shown in Figures 3, in use the air guiding device 1' is installed in the central well area of standard annular air filter 9' within the filter element. The hole 3' (in Figure 2) of the air guiding device receives an air filter closure securing bolt 10' which protrudes from the base of the air filter 9'. The bolt 10' passes through the hole 3' (in Figure 2) and is used to locate an air filter closure 11' upon the air filter 9'. The closure 11' is secured to the air filter 9' by means of a butterfly nut 12' or the like. The air guiding system 1' is firmly located on the bolt 10' by its own griping force that is induced by the tight fit of hole 3' (in Figure 2) with the bolt 10' in the air filter 9'.

The vanes 4' of the air guiding device 1' are positioned in the air filter 9' so as to guide filtered air become vortical and/or turbulent axial air flow to the entrance of an inlet manifold 13' leading to a carburettor 14' or the like (such as fuel injection unit).

The air guiding device 1, 1' shown in Figures 1 and 2 mean that air passing through the air filter 9, 9' is travelling either in radial flow or axial flow before its pass through the air guiding device. The present invention will guide the filtered air at axial flow direction and remain the same axial flow direction with vortical and/or turbulent air flow to the entrance of an inlet manifold 13' leading to a carburettor or fuel injection unit 14'. Fuel droplets provided by the carburettor or fuel injection unit 14' mix more readily with the vortical and/or turbulent air flow than non-vortical flow which normally the case in origin.

Thus, a better mixture of fuel and air is achieved and the resulting homogeneous mixture is more readily and efficiently combustion in the combustion chamber of the engine.

The operation of the air guiding devices 1, 1' shown in Figures 1 and 2, is significantly improved for low air flow rates by the tabs 6, 6' provided on the air exiting edges of the vanes 4, 4' . When the air flow rate through the air filter 9, 9' (in Figure 3 and 4) is low, such as when the engine is idling, and the deflecting action of the vanes 4, 4' is not appreciable, the small tabs 6, 6' serve to deflect the air flow as filtered air enters the narrow opening between the vane 4 and 4i, 4i and 4ii, 4ii and 4.

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Due to the vane in the Figure 1 is designed as air exiting end is point toward clockwise direction and fc rm an angel to axial at about 25^0, the filtered air will resulting in a vortical and/or turbulent air flow in the inlet manifold at clockwise direction in axial air flow in engine induction stroke in present invention. The resultant air flow that has passed through the air guiding device 1, 1' may be turbulent and/or vortical.

The tabs 6, 6' may, in an alternative embodiment of the air guiding device 1, 1' , is extended from the vane at air exiting end which normally is formed by a triangle shape. The tabs 6, 6' is angled to the vane with about 155^0 at higher pressure side. The tabs 6,6' is formed at high pressure side not only creates the turbulent air flow but also enhances the vortical air flow.

The high pressure side of the vane normally is refer the plane of the vane which facing the air flow side.

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CLAIMS:

1. An air guiding device for producing a vortical and/or turbulent air flow in axial flow in an inlet manifold, which device comprises a fixed supporting structure, a plurality of vanes carried by the supporting structure for deflecting an air flow impinging on the device in a first direction, a tab at the high pressure side associated with at least one of the vanes for deflecting the air flow in a second direction, the arrangement is such that the air flow impinging on the device is deflected into a vortical and/or turbulent air flow by the vanes and/or the tab or tabs.

2. An axial flow air guiding device according to Claim 1, wherein the improvement comprise the tab or tabs that located at edge of the vane at air flow exiting end to produce vortical and/or turbulent in axial air flow for better mixture of fuel and air with less energy consumption compare to radial flow.

3. An axial flow air guiding device according to Claim 1 or 2, wherein the device is located adjacent an inlet manifold entrance such that the vortical and/or turbulent air flow is drawn into the inlet manifold.

4. An axial flow air guiding device according to any preceding claim, wherein the supporting structure is a cylindrical and the vanes are arranged extend inwardly from the cylindrical supporting wall .

5. An axial flow air guiding device according to Claim 4, wherein the vane is angle to axial at about 25^0.

6. An axial flow air guiding device according to any preceding claim, wherein the or each tab is formed on edge of the vane at the air flow exiting end.

7. An axial flow air guiding device according to Claim 6, wherein the or each tab is disposed at approximately 155^0 to the associated vane at the high pressure side.

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8. An axial flow air guiding device according to any one of the Claim 1 to 7, wherein the device is interposed between and air filter and an inlet manifold entrance.

9. An axial flow air guiding device substantially as hereinbefore described with reference to and as shown in the accompanying drawings.