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EXHAUST SYSTEMS OF INTERNAL COMBUSTION ENGINES

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Fig. 1.

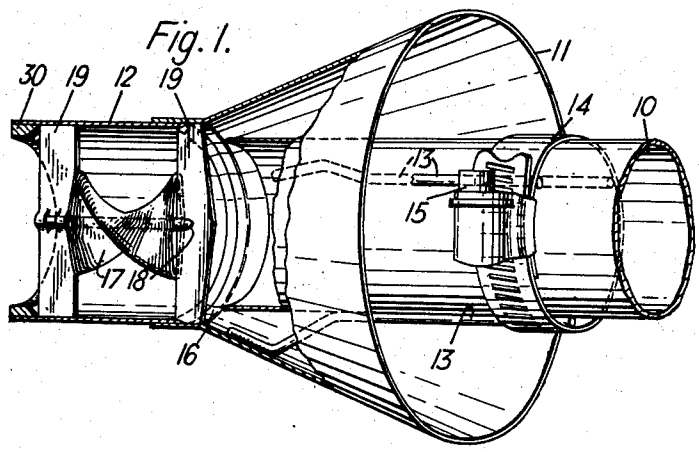


Fig. 2.

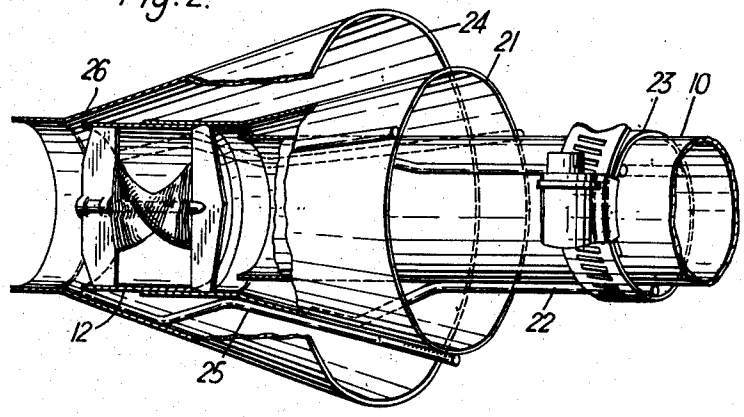
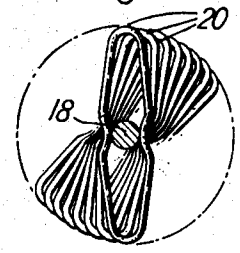


Fig. 3.



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EXHAUST SYSTEMS OF INTERNAL COMBUSTION ENGINES

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4 Claims. (Cl. 60—30)

This invention relates to a device for use in combination with the exhaust system of an internal combustion engine. One object of the invention is to provide a device which will lead to an increase in the power output of the engine by reducing the back pressure in the exhaust system.

A further object of the invention is to provide a device which will lead to a more thorough scavenging of the burnt gases from the combustion space and thus a reduction in the rate at which carbon deposits build up in the combustion space.

The principal field of application of the device is in relation to motor vehicles propelled by internal combustion engines, using petrol or diesel fuel and hereinafter certain embodiments of the device are described by way of example and with reference to the drawings accompanying the specification in order to illustrate the working of the invention.

In the accompanying drawings:

Figure 1 is a part-sectional perspective view showing one form of the device as it appears when applied to the exhaust outlet pipe of a motor vehicle.

Figure 2 is a part-sectional perspective view of a modified form of the device also applied to the exhaust outlet pipe of a motor vehicle.

Figure 3 is an enlarged end view of the helical deflector member.

Referring to Figure 1, the device is shown applied and mounted upon the exhaust outlet pipe **10**, which leads from the exhaust silencer of a motor vehicle exhaust system. The device comprises a frusto-conical member **11** which at its narrower end is connected to an outlet tube **12** arranged co-axially with the frusto-conical member and as will be seen, this outlet tube **12** is co-axial with the outlet pipe **10** when the device is mounted in position.

The device is supported upon the outlet pipe **10** by means of three or more spaced support rods **13** which are cranked at their inner ends and have these inner ends secured, such as by welding to the inner surface of the frusto-conical member **11** adjacent its narrower end. At their outer ends the support rods **13** are secured to an adjustable band clip **14** which is of the worm and ratchet type, having a member **15** for operating the worm to tighten the band clip **14** upon the outlet pipe **10**, so as to secure the device in position and it will be observed that when the device is correctly mounted upon the outlet pipe **10**, the inner end of the outlet tube **12** is spaced a short distance away from the outer end of the outlet pipe **10** so as to leave an annular passage **16** leading from the frusto-conical member into the outlet tube **12**.

Mounted co-axially within the outlet tube **12** is the helical deflector member **17**, which as shown is mounted about a central pin **18**, the ends of which are secured to two supporting strips **19** which extend diametrically across the outlet tube **12** and are fixed at their ends to the inner surface of the outlet tube.

On larger sizes of exhaust outlet pipes the supporting strips **19** may be set so that the plane of each strip is at an angle to the radial plane such that the strips act to

deflect the gases and add to the spiralling effect which is obtained from the deflector member.

Referring to Figure 3, one form of helical deflector member is there shown in enlargement and it will be seen to consist of a closed coiled wire spring formation, which has a number of coils **20**, each of these coils being of an elongated oval formation and the helical deflector member being formed by twisting the wire spring formation bodily about its central axis, so that it takes up a helical form as shown in Figure 3, the ends of the helix being then welded to the supporting strips **19**.

This particular form of helical deflector member has been found to have advantages over other forms and is particularly suitable for the smaller sizes of exhaust pipes such as are encountered on private motor cars and small vans. However, for larger size engines such as those on very large cars and heavy lorries where exhaust pipe diameters are greater, it may be more convenient to use a helical member which is of a solid wall construction and may for example be made from sheet metal so as to have the effect of a flat tube which has been twisted to helical form, so that there is a helical shaped passage extending down through the deflector member in the same way as there is left a helical shaped passage extending through the deflector member which is in the form shown in Figure 3.

For larger sizes exhaust outlet pipes the device is also preferably fitted, or formed, with a restricting ring such as shown at **30** in Figure 1 at the end of the outlet tube **12**. In practice this is found to increase the speed of expulsion of the gases and ensures that the gases come under the full influence of the helical deflector member so as to create the desired helical flow of the gases.

Also in some vehicles it may be more convenient to have a frusto-conical member **11** which is other than circular in cross-section and for example, a particularly advantageous form in connection with some vehicles is a frusto-conical member having an oval cross-section. The frusto-conical member and outlet tube together form a venturi arrangement around the outlet end of the tail pipe **10** and there have been previous proposals for devices of this nature which have had as a basis, the provision of such a venturi arrangement. Such previous devices have been unsuccessful in practice because they rely upon the motion of the vehicle to produce an air flow through the frusto-conical member and this alone is insufficient to produce any material reduction in pressure in the exhaust system.

However, with the present invention, due to the presence of the helical deflector member **17** which because it is disposed in the path of the exhaust gases causes these gases to be deflected into a helical path having the effect of creating a vortex with its attendant region of partial vacuum at the centre, there is created a reduction in the pressure in the whole exhaust system. Further the creation of a vortex has the effect of drawing in the air flow through the frusto-conical member **11** and the complete flow through the outlet tube **12** is then a smooth helical flow.

Practical tests rave proved that the creation of a vortex in the issuing exhaust gases and combined air flow leads to a substantial reduction in the back pressure in the exhaust system and consequently a corresponding increase in power from the engine. Also the present device is not dependent upon motion of the vehicle for its operation, because further tests made when a vehicle is stationary show that there is a marked increase in the carbon content of the exhaust gases when the device is fitted to an exhaust system. This is due to the fact that the creation of the vortex in the exhaust gases does not depend upon the motion of the vehicle but is simply due to the presence of the helical deflector member,

and this leads to a further advantage in connection with the invention, in that it can be used with exhaust systems in which the outlet pipe extends in any direction apart from the normal horizontal position for motor vehicles.

Some increase in the amount of petrol consumption due to the increased volume of the gases may be observed with the use of this device but there will be a corresponding increase in power and acceleration. If the question of fuel consumption is immaterial, a greater effect may be obtained by the use of a modified form of the device shown in Figure 2.

This form of the device is similar to that shown in Figure 1 in the construction and disposition of the helical deflector member, but in this case there is provided an inner frusto-conical member **21**, which is provided with cranked support rods **22** connected to a band clip **23** for securing the device to the outlet pipe **10** of a motor vehicle and there is also provided an outer frusto-conical member **24** which is secured to the inner member **21** by means of the cranked support rods **25** and the narrower end of the outer frusto-conical member **24** is positioned so that it is spaced a slight distance away from the end of the outlet tube **12**, leaving a narrower annular gap **26**, through which air flow from the outer frusto-conical member **24** passes and the venturi effect of this air flow is added to the pressure-reducing effect already created by the presence of the helical deflector member and the air flow through the inner frusto-conical member **21**.

What I claim then is:

1. In combination with the exhaust outlet pipe of an internal combustion engine, a device for creating a reduction in the pressure in the exhaust system comprising, a frusto-conical member of open-ended formation, an outlet tube extending co-axially from the smaller end of the frusto-conical member, a pair of supporting strips each extending diametrically across the interior of said outlet tube and disposed one near each end thereof, a pin supported at its ends by said strips so as to extend axially within said tube, a deflector member of helical formation mounted co-axially upon said pin, said deflector member consisting of a close coiled wire spring formation having coils of oval shape, being bodily twisted into helical form, and means connecting said device to the exhaust outlet pipe of the exhaust system, said outlet tube being co-axial with the exhaust outlet pipe and the exhaust outlet pipe projecting into the frusto-conical member from the larger end thereof, there being a nannular gap between the periphery of the outer end of the exhaust outlet pipe and the periphery of the inner end of said outlet tube.

2. In combination with the exhaust outlet pipe of an internal combustion engine, a device for creating a reduction in the pressure in the exhaust system comprising, a frusto-conical member of open-ended formation, an outlet tube extending co-axially from the smaller end of the frusto-conical member, a deflector member of helical formation mounted co-axially within said outlet tube, said deflector member consisting of a close coiled wire spring formation having coils of oval shape, being bodily twisted into helical form, a plurality of spaced support rods connected at their inner ends to the interior of the smaller end of the frusto-conical member, and an adjustable band clip surrounding the exhaust outlet pipe, the outer ends of said rods being connected to said bandclip, said outlet tube being co-axial with the exhaust outlet pipe and the exhaust outlet pipe projecting into the frusto-conical member from the larger end thereof, there being an annular gap between the periphery of the outer end of the exhaust outlet pipe and the periphery of the inner end of said outlet tube.

3. In combination with the exhaust outlet pipe of an internal combustion engine, a device for creating a reduction in the pressure in the exhaust system comprising a frusto-conical member of open-ended formation, an outlet tube extending co-axially from the smaller end of the frusto-conical member, a deflector member of helical formation mounted co-axially within said outlet tube, said deflector member consisting of a close coiled wire spring formation having coils of elongated oval shape being bodily twisted into helical form and means connecting said device to the exhaust outlet pipe of the exhaust system, said outlet tube being co-axial with the exhaust outlet pipe and the exhaust outlet pipe projecting into the frusto-conical member from the larger end thereof, there being an annular gap between the periphery of the outer end of the exhaust outlet pipe and the periphery of the inner end of said outlet tube.

4. A device according to claim 3 including a second frusto-conical member mounted co-axially outside said first-mentioned frusto-conical member and having its smaller end adjacent the outer end of said outlet tube so as to leave an annular gap between such smaller end and the periphery of the said outlet tube.

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