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EXHAUST DEVICE FOR INTERNAL COMBUSTION ENGINES

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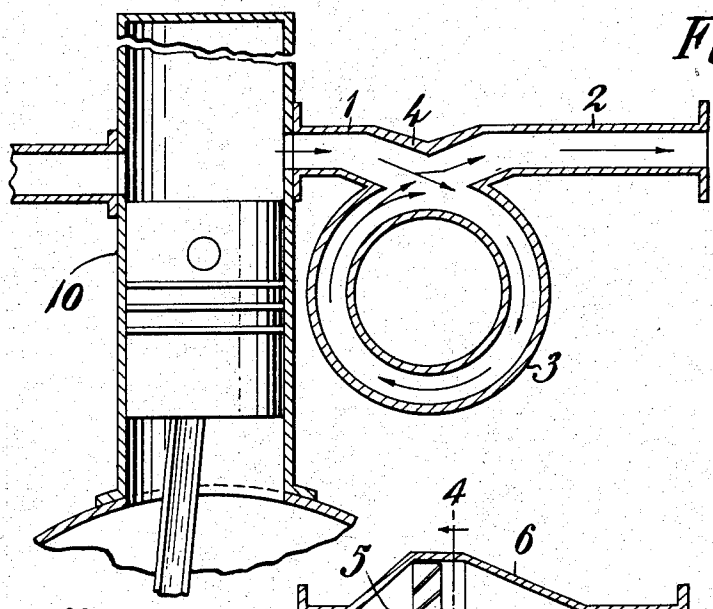


Fig. 1

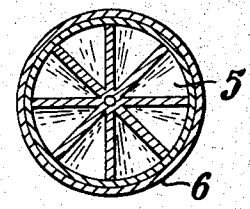


Fig. 4

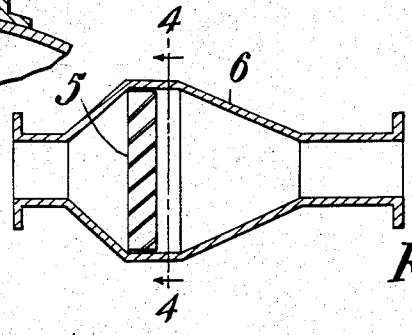


Fig. 2

Fig. 3

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EXHAUST DEVICE FOR INTERNAL COMBUSTION ENGINES

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2 Claims. (Cl. 60—32)

The invention relates to two-stroke internal combustion engines, wherein the evacuation of the cylinder by the bodily displacement of the burnt gases from the cylinder into the exhaust system is utilised for the purpose of introducing a fresh charge by controlling the inlet orifice to open for the introduction of the said charge when the exhaust gases are moving outwardly through the exhaust port or duct as a consequence of this bodily displacement from the cylinder.

In such an engine two disturbing factors occur which may have an objectionable action upon the charge introduced into the cylinder.

When the gases have reached the end of their outward travel as a consequence of their bodily displacement from the cylinder their movement is reversed in direction and the return impact, if the exhaust port is then still open, may cause the charge in the cylinder to be fouled and some of this charge to be forced out of the inlet ports.

In any case when this reversal in direction occurs it will tend to arrest the further entry of air through the inlet ports.

Further, if the inlet ports close at the end of the charging period before the exhaust ports are closed and the mass of burnt gases is then still moving outwardly through the exhaust system, this may cause some of the charge contained in the cylinder to be drawn into the exhaust system through the open exhaust ports.

The object of the invention is to provide means whereby the objectionable actions of an untimely return of the burnt gases or of a prolonged suction in the exhaust system may be minimised.

The invention will now be described with reference to the accompanying drawing, in which:—

Figure 1 relates to one embodiment of the invention in which the issuing mass of burnt gases is directed on to a small gaseous mass in the exhaust system and exerts its pressure on the main atmosphere in a continuous manner.

Figure 2 relates to an embodiment in which the explosion gases are constrained to follow an elongated spiral path.

Figure 3 relates to an embodiment in which the explosion gases escape to the atmosphere gradually.

Figure 4 is a section of Figure 3 on line 4—4 looking in the direction of the arrows.

In the arrangement illustrated in Figure 1, the exhaust pipe comprises a short duct 1 for connection to the cylinder 10, a duct 2 in continuation of the duct 1 and leading to the atmosphere, and between these two portions an annular chamber 3 arranged as a by-pass on the main exhaust pipe 1, 2 and in open communication with both 1 and 2.

The body of explosion gases leaving the engine cylinder encounters a reflecting surface 4 on the wall of the duct opposite the entry to the chamber 3, which is situated so as to direct the said body into the annular chamber 3, the volume of which will be substantially the same as that of the engine cylinder.

The gases then follow by a series of reflections a continuous path in the chamber 3 while exerting a component of their force upon the main mass in the duct 2.

The face of the gaseous column in the duct 2 in this case forms a reflecting surface on which the gases impinge, and which yields as the atmospheric column in the duct 2 is put into movement in the direction of exhaust.

In the arrangement illustrated in Figure 2, an assembly of fixed guide vanes or blades 5 is mounted in the exhaust duct 6 in order to impart to the issuing explosion gases a whirling or screw motion.

This assembly will be fitted as close as possible to the cylinder and between the engine and the silencer. The area of passage for the gases will be made such that the volume of gases dealt with can pass freely.

The blades 5 act as deflecting surfaces and, in combination with the enclosing walls of the duct 6, impose rotary forward movement on the explosion gases whereby the absolute velocity of the latter is not appreciably reduced but the relative speed of forward motion is reduced but never wholly destroyed.

The body of explosion gases is thus made to act like a screw action upon the atmospheric mass in the duct 6, so as to exert a continuous pressure on the latter, until this atmospheric resistance is broken down and the explosion gases can escape.

The arrangement shown in Figure 3 differs from the foregoing in that the exhaust duct is no longer, properly speaking, freely open to the atmosphere.

In this case the exhaust duct opens into the annular chamber 8, forming a closed circuit, situated preferably as close as possible to the latter and having a volume a little larger than the cylinder volume.

The explosion gases project from the cylinder and encounter deflecting surfaces formed by the walls of the duct 7 which direct them into the chamber 8 and in this chamber they undergo a

series of deflections which compel them to follow a continuous closed path in this chamber.

The peripheral walls of the chamber 8 are provided with small orifices 9 leading to the atmosphere and suitably directed to facilitate the escape of the explosion gases.

The explosion gases circulating without loss of absolute velocity in the chamber 8 are thus projected gradually into the external atmosphere through the orifices 9 and any return to the cylinder by rebounding from the external atmospheric mass is thus prevented.

It will be understood from the foregoing that all the devices described are adapted to cause the issuing mass of burnt gases to travel along an elongated path without thereby increasing the resistance to motion of the gases along this path and that the devices do not obstruct the outflow of the burnt gases in any way or comprise any surfaces which would tend to reflect the mass of burnt gases back towards the cylinder.

It will also be understood from the foregoing that in order to be effective, the devices according to the invention must be placed nearer the cylinder than the point from which the rebound of the gases to the cylinder would occur, as they will otherwise have no influence in preventing this rebound.

With all the devices hereinbefore described, the vacuum is maintained in the cylinder during a period of time amply sufficient to permit the cylinder to be recharged by atmospheric pressure if desired.

The objectionable effect of a return of the burnt gases towards the cylinder is attenuated or wholly destroyed. A loss of charge due to a prolonged suction in the exhaust system is also reduced or avoided completely according to the position in which the device is placed in the exhaust system, since it will be understood that the volume of the void left in the cylinder and in the exhaust system by the issuing mass of burnt gases will depend upon the distance the device according to the invention is placed from the cylinder.

I claim:

1. A two stroke cycle internal combustion engine wherein the burnt gases are discharged from the cylinder into an exhaust conduit substantially as a mass whereby the said mass moves outward and thereafter returns towards the cylinder from a point which may be within the said exhaust conduit, and wherein an inlet is opened for the introduction of fresh charge while the exhaust port is still open and when the said issuance of the burnt gases is in full progress and causes a suction effect to be exerted in the cylinder, the said exhaust conduit providing a free passage for the burnt gases to the limit of outward travel of said mass and having a chamber in connection with said passage and wherein substantially the whole mass of burnt gases after leaving the cylinder is guided and is caused to adopt a whirling motion as a compact mass whereby the outward motion of the said mass is prolonged and the rebound of said mass towards the cylinder is delayed and reduced in intensity.

2. A two-stroke cycle internal combustion engine wherein the burnt gases are discharged from the cylinder into an exhaust conduit substantially as a mass whereby the said mass moves outward and thereafter returns towards the cylinder from a point which may be within the said exhaust conduit, and wherein an inlet is opened for the introduction of fresh charge while the exhaust port is still open and when the said issuance of the burnt gases is in full progress and causes a suction effect to be exerted in the cylinder, the said exhaust conduit providing a free passage for the burnt gases to the limit of outward travel of said mass and having a chamber in connection with said passage into which substantially the whole mass of burnt gases is guided after leaving the cylinder, the axis of the chamber being in line with that of the exhaust conduit, said chamber having substantially the same volume as the engine cylinder and having a widened portion in which stationary guiding blades are positioned, which give a spiral motion to the burnt gases, whereby the outward motion of the said mass is prolonged and the rebound of said mass towards the cylinder is delayed and reduced in intensity.

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