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(54) **Silencer device for internal combustion engines.**

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Description

The present invention relates to a silencer device to reduce noises and sounds generated by exhaust gases in otto- or diesel-cycle engines, when an exhaust brake is applied to said engines.

Various exhaust-brake devices are currently being used on internal combustion engines, suitable to increase the braking effect of the engine, transforming the engine itself into an air compressor.

The fuel supply is eliminated:

- in injection engines through a direct control ("engine stop" control already existing), that zeroes the flow-rate of the injection pump;
- in carburation engines, opening an air intake of the atmosphere to the induction manifold (lateral passage to the carburettor): with this, the fuel induction stops and there occurs, like in diesel engines, a free intake of fresh air.

The inconvenience with said exhaust brakes is the noise generated by the expansion, in exhaust ducts, of the air compressed by the pistons, that cannot be dampened by the exhaust muffler, since it is designed to absorb the sound waves produced by the combustion burst.

In fact, the gases burnt in internal combustion engines, that cyclically flow into the exhaust manifold through the exhaust valves, produce, when the valves are being opened, a deafening noise with free exhaust; therefore, to reduce this free exhaust noise, an exhaust muffler is applied to the exhaust pipe end. This muffler, built for that purpose, has no effect when the fuel supply is stopped when it is time to operate on the exhaust brake: the combustion noise is then replaced by the noise of the compressed air going out of the exhaust manifolds and expanding; this noise, being of a different nature and frequency from the one typical of the combustion, will not be able to be absorbed by the traditional exhaust muffler.

Purpose of the present invention is eliminating or substantially reducing the noise generated by the air compressed by the pistons of an internal combustion engine, when this is subjected to the exhaust brake action, operating upstream of the muffler and in series with it, exploiting the principle of sound energy (and therefore noise) reduction, through the wave reflection on the conducing pipe walls, following diameter variations of the pipes themselves (it is in fact known that the increase of a pipe section generates the decrease of low-frequency noises).

Another purpose is of the device is being suitable to any diameter of exhaust manifolds and mufflers connected to it, and therefore being able to be used for any engine displacement.

A further purpose of the device is being easily manufactured at low costs, due to assembling rationality and linearity.

The above purposes of the invention are reached by a silencer device as claimed.

A preferred embodiment of the invention will now be described, as a non-limiting example, with reference to the enclosed drawings, in which:

- fig. 1 is a diagrammatic front view of the device;
- fig. 2 is a diagrammatic view along the section II-II of the device in fig. 1;
- fig. 3 is a diagrammatic side view of the device in fig. 1 in its preferred operating assembly on a vehicle.

Referring to fig. 2 and 3, the device 1 is composed of a hollow body 3, usually made of steel, whose shape is substantially spheroidal and whose section is approximately ovoidal, equipped with an inlet opening 5 connected, through a duct 7, to the exhaust mainfold 9 of the turbo 1Ø of the engine 11 equipped with an exhaust brake 12, and with an outlet opening 13 connected, through a duct 15, to the muffler 17. The compressed air going out of the manifold enters into the device 1 from the inlet opening 5 and, since the section of the device 1 is greater than that of the exhaust manifold 9 and of the muffler 17, and since said opening 5 does not lay on the same axis as that of the outlet one 13, and since the axis of the device 1 is raking with respect to those of the two openings 5 and 13, said air reflects expanding inside the hollow body 3, losing kinetic energy, and the sound waves related to it are damped; the compressed air that expands in the exhaust ducts, afterwards, gose out through the outlet opening 13 towards the muffler 17.

Claims

1. Silencer device (1) operating on the exhaust gases of internal combustion engines e.g. otto and diesel ones (11) equipped with exhaust brake (12), characterized in that:

said silencer device (1) is composed of a hollow body (3) whose shape is substantially spheroidal and whose section is approximately ovoidal, said silencer device being equipped with an inlet opening (5) and an outlet opening (13), said inlet opening (5) being connected through a duct (7) to the exhaust manifold (9) of the engine (11) downstream thereof, said outlet opening (13) being connected through a duct (15) to the muffler (17) upstream thereof;

in that said section of said silencer device (1) is greater than those of the exhaust manifold (9) and of the muffler (17);

in that said inlet opening (5) does not lay

on the same axis as that of said outlet opening (13); and

in that the axis of said silencer device (1) is raking with respect to the axes of said inlet and said outlet openings (5, 13);

said silencer device (1), upon operation of said exhaust brake (12), being apt to reflect the compressed air generated by the pistons, making said compressed air expand inside the hollow body (3) thereof and lose kinetic energy, the sound waves related to said compressed air being damped.

Patentansprüche

1. Schalldämpfervorrichtung (1) zur Einwirkung auf die Abgase von Kraftmaschinen für innere Verbrennung, beispielsweise von Otto- und Dieselmaschinen (11), die mit einer Auspuffbremse (12) ausgerüstet sind, dadurch gekennzeichnet, daß:
die genannte Schalldämpfervorrichtung (1) aus einem Hohlkörper (3) gebildet ist, dessen Form im wesentlichen sphäroidförmig ist und dessen Querschnitt im wesentlichen eiförmig ist, wobei die genannte Schalldämpfervorrichtung mit einer Einlaßöffnung (5) und einer Auslaßöffnung (13) ausgerüstet ist, die genannte Einlaßöffnung (5) über einen Durchgang (7) mit der Auspuffleitung (9) der Maschine (11), stromabwärts derselben, verbunden ist, die genannte Auslaßöffnung (13) über einen Durchgang (15) mit der Schalldämpferanlage (17), stromaufwärts derselben, verbunden ist;
der genannte Querschnitt der genannten Schalldämpfervorrichtung (1) größer als derjenige der Auspuffleitung (9) und derjenige der Schalldämpferanlage (17) ist;
die genannte Einlaßöffnung (5) achsversetzt zu der genannten Auslaßöffnung (13) gelegen ist und
die Achse der genannten Schalldämpfervorrichtung (1) relativ zu den Achsen der genannten Einlaß- und Auslaßöffnungen (5, 13) schrägstehend ist;
wobei die genannte Schalldämpfervorrichtung (1) bei Betätigung der genannten Auspuffbremse (12) dazu fähig ist, die durch die Kolben erzeugte, komprimierte Luft zu reflektieren und eine Expansion der genannten komprimierten Luft innerhalb seines Hohlkörpers (3) mit einem Verlust an kinetischer Energie zu bewirken, wobei die mit der genannten komprimierten Luft in Bezug stehenden Schallwellen gedämpft werden.

Revendications

1. Dispositif de silencieux (1) agissant sur les gaz d'échappement des moteurs à combustion interne, par exemple des moteurs à allumage commandé et à cycle diesel (11) équipés d'un frein sur l'échappement (12), caractérisé en ce que:

ledit dispositif de silencieux (1) est constitué d'un corps creux (3) dont la forme est sensiblement sphéroïdale, et dont la section est sensiblement ovoïdale, ledit dispositif de silencieux étant équipé d'une ouverture d'entrée (5) et d'une ouverture de sortie (13), ladite ouverture d'entrée (5) étant reliée via un conduit (7) au collecteur d'échappement (9) du moteur (11) en aval de celui-ci, ladite ouverture de sortie (13) étant reliée via un conduit (15) au circuit d'échappement (17) en amont de celui-ci;

en ce que ladite section dudit dispositif silencieux (1) est supérieure à celle du collecteur d'échappement (9) et à celle du circuit d'échappement (17);

en ce que ladite ouverture d'entrée (5) n'est pas située sur le même axe que ladite ouverture de sortie (13); et

en ce que l'axe dudit dispositif de silencieux (1) est incliné par rapport aux axes desdites ouvertures d'entrée et de sortie (5, 13);

ledit dispositif de silencieux (1), sous l'action dudit frein sur l'échappement (12), étant apte à réfléchir l'air comprimé produit par les pistons, en faisant se dilater ledit air comprimé à l'intérieur du corps creux (3) dudit dispositif et en lui faisant perdre son énergie cinétique, les ondes sonores relatives audit air comprimé étant amorties.

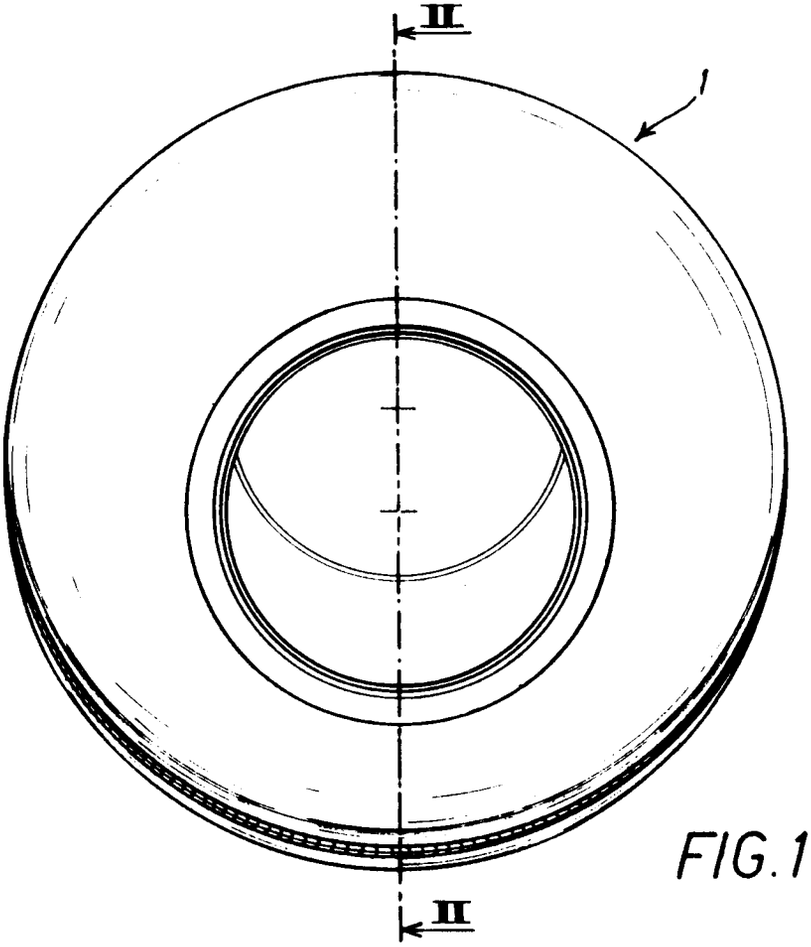


FIG.1

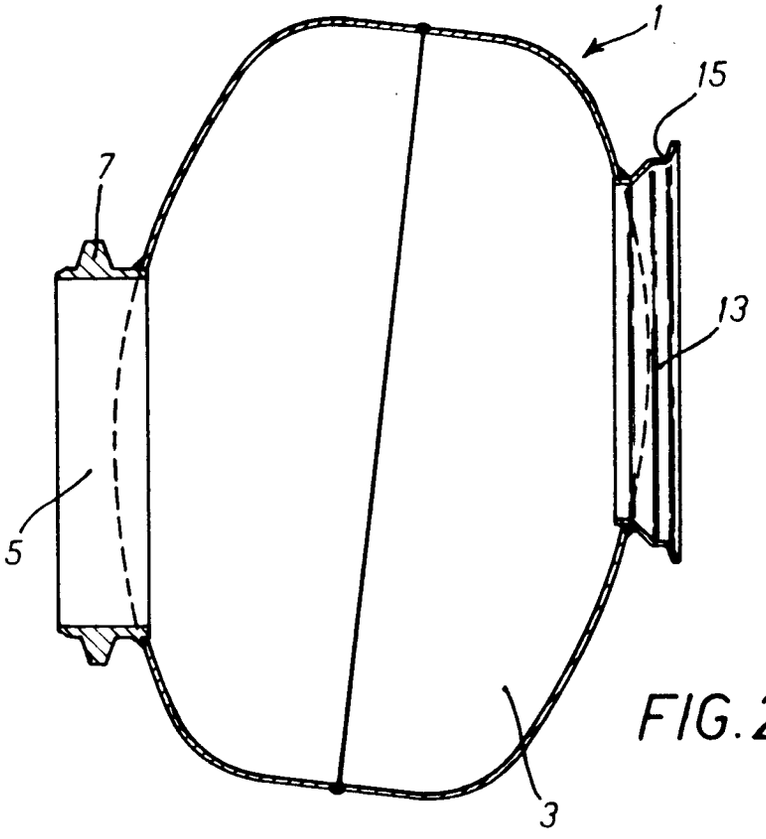


FIG.2

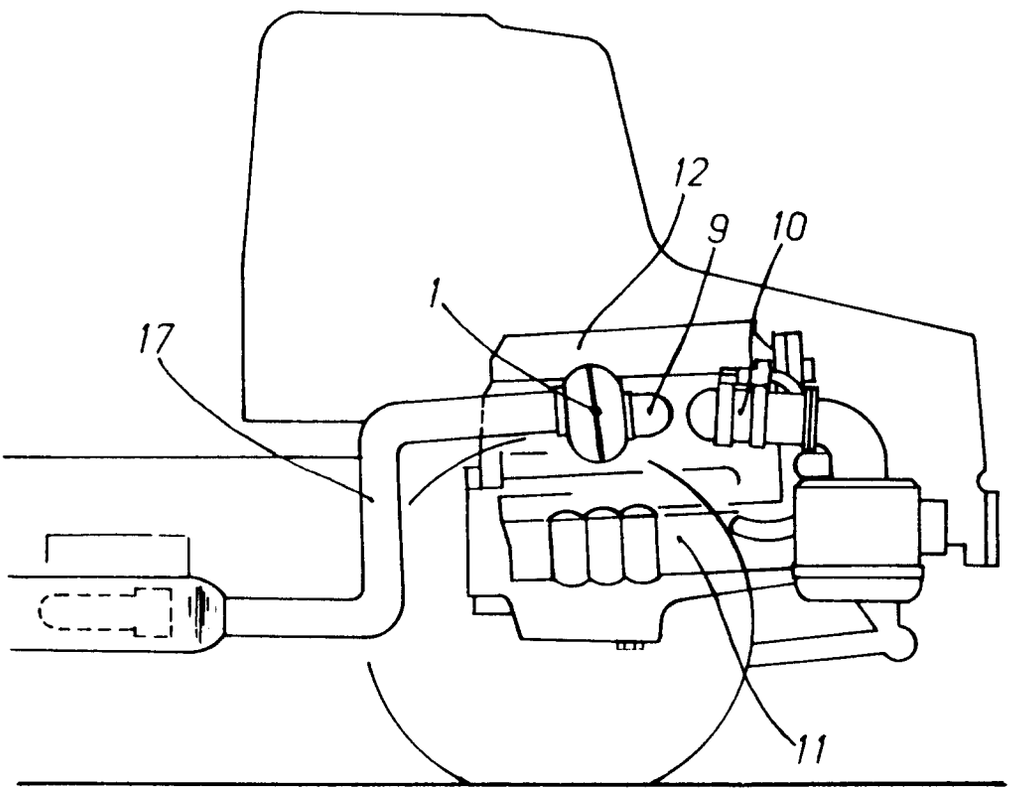


FIG. 3