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(54) **Device for oil vapours separation from the crankcase of an internal combustion engine and connection for blow-by of said vapours**

Ölabscheider für die Gase des Kurbelgehäuses einer Brennkraftmaschine und Verbindung für die Durchblasgase

Dispositif pour séparer les gaz de carter d'un moteur à combustion interne et liaison pour ces gaz

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Description

[0001] The present invention refers to a device to separate oil vapours from the crankcase of an internal combustion engine (blow by) provided with manifolds for connection to the blow-by circuit of said vapours and of a manifold to let fresh oil in the crankcase sump.

[0002] In the conventional internal combustion engines, the separator device for the blow-by oil vapours, that come from the sump and from the crank chamber, is typically made as a separate part which is added to the engine when this one is being assembled.

[0003] This procedure makes it necessary to build either ducts internal to the crankcase and a small support base for the separator, and to take into account the dimensions of it while placing the propulsor in the engine compartment.

[0004] The European patent application EP 0 291 358 shows a separator device for the blow-by oil vapours from an internal combustion engine crankcase, consisting of a base and a cover in which the base is made by means of fusion integral to the crankcase of the engine in correspondance with one of its side walls. The separator device is closed by a lid plate whit an opening connected to the intake manifold through a pipe line. This separator do not need a support base as the conventional one, but the lid cannot be used neither to enlarge the separator nor to let fresh oil in the crankcase sump.

[0005] It is an object of the present invention to give a solution to the aforementioned inconveniences.

[0006] Said object is achived by means of a separator for blow-by vapours presenting the characteristics indicated in claim 1.

[0007] One of the advantages of the present invention consists in that it presents two access manifolds to the separator from the crank chamber, said access manifolds being spaced and located on a plane parallel to the axis of the crankcase. This makes it possible to keep one manifold constantly free, even in the case the inclination of the engine is very high, so that no oil can be sucked into the crank chamber.

[0008] Additional features and advantages of the present invention will become evident from the reading of the description of the accompanying drawings, provided as non-restrictive example, in which:

- figure 1 is a part sectional perspective view of an internal combustion engine crankcase provided with the device of the invention illustrated in exploded view, and
- figure 2 is a perspective view of the cover of the separator device of figure 1.

[0009] With reference to the figures, and especially to figure 1, the reference number 2 indicates the crankcase of an internal combustion engine made by means of ground fusion. The crankcase presents in-line cylinders and one crank chamber 5 on the side wall of the cylinders. In the case of a four in-line cylinder engine, here illustrated, at least two passages 6 and 7 for the oil vapours are built by fusion in correspondence with the second and third bay of the crankcase. Said passages, which are positioned in order not to interfere with the connecting rods, and which lay, spaced, on a plane parallel to the longitudinal axis of the crankcase, make the crank chamber communicate with the external wall of the crankcase through the holes 9 and 10. The holes 9 and 10 open inside a body forming the lower section, or base, 11, of a compartment for the separation 12 of oil vapours, said compartment being basically shaped as an equilateral triangle, in correspondence with the ends of one of its sides which is basically parallel to the plane defined by the upper face of the crankcase. This separator, built by fusion together with the crankcase, presents inside walls forming a labyrinth and one vertex pointing towards the lower part of the crankcase. The upper section or cover 13 of the separator compartment, which is made separately, again presents in its internal part the labyrinth pattern of the crankcase 11, and presents two manifolds 15 and 16, being the first one 15 adapted to carry vapours to the blow-by system and the second one 16 used as an inlet for fresh oil.

[0010] A passage 18, is made centrally, in correspondence with the vertex pointing downwards, in the separator 12 and in the wall of the crankcase, and a manifold 19 built by fusion and connected to it, allow to introduce oil in the engine sump.

[0011] A few notches 21, made in the walls of the labyrinth, allow the decantation oil to return to the sump through the manifold 19.

[0012] The base and the cover of the separator are jointed by conventional means, i.e. screws, and a seal (not shown) can be put between them if necessary.

[0013] In the way described above it is possible to achieve a compact and functional separator, without excessive need of tool machines, and at a very low cost.

[0014] Besides, as already mentioned before, the two manifolds, spaced and parallel to the axis of the crankcase, allow the suction of blow-by vapours to be always free, independently from the working position of the engine.

Claims

1. Separator for oil vapours from an internal combustion engine crankcase (blow-by) consisting of a base and a cover, whereby the cover as (11) made by means of fusion integral to the crankcase (2) of the engine in correspondence with one of its side walls, and is connected to the crank chamber of the engine through at least one manifold (6, 7) made by fusion in the side wall of the crankcase, and whereby the cover (13) presents a manifold (15) to carry the blow-by vapours to the throttle body of the engine feeding system, **characterized in that** the cov-

er (13) presents a further manifold (16) to let fresh oil into the engine.

2. Separator as claimed in claim 1 **characterised in that** the cover (13) and the base are provided with internal walls which make, thus forming a labyrinth.

3. Separator as claimed in claim 1 **characterised in that** said further manifold is connected to the engine sump through a passage (18) made in the separator in correspondence with the vertex pointing downwards and through a manifold (19) made by fusion in the crankcase wall (2).

4. Separator as claimed in the previous claims **characterised in that** notches (21) for the passage of decantation oil are made in the walls forming the labyrinth.

Patentansprüche

1. Ölabscheider für die Gase des Kurbelgehäuses einer Brennkraftmaschine (Durchblasen), umfassend ein Unterteil (11) und einen Deckel, wobei der Dekkel durch Schmelzen direkt auf das Kurbelgehäuse (2) des Motors in Übereinstimmung mit einer seiner Seitenwände hergestellt ist, und mit der Kurbelgehäusekammer des Motors über mindestens einen Krümmer (6, 7) verbunden ist, der durch Schmelzen in der Seitenwand des Kurbelgehäuses hergestellt ist, und wobei der Deckel (13) einen Krümmer (15) aufweist, um die Durchblasgase zum Drosselklappengehäuse des Zuführungssystems des Motors zu leiten, **dadurch gekennzeichnet**, das der Dekkel (13) einen weiteren Krümmer (16) aufweist, um Frischöl in den Motor zu leiten.

2. Abscheider nach Anspruch 1 **dadurch gekennzeichnet, dass** der Deckel (13) und das Unterteil mit Innenwänden versehen sind, welche folglich ein Labyrinth bilden.

3. Abscheider nach Anspruch 1, **dadurch gekennzeichnet**, das der weitere Krümmer mit der Motorwanne über einen Kanal (18), der in dem Abscheider in Übereinstimmung mit dem Scheitelpunkt hergestellt ist, der nach unten zeigt, und über einen Krümmer (19), der durch Schmelzen in der Kurbelgehäusewand (2) hergestellt ist, verbunden ist.

4. Abscheider nach den vorangegangenen Ansprüchen, **dadurch gekennzeichnet, dass** die Einschnitte (21) für das Durchfließen des Abscheideröls in den Wänden hergestellt sind, welche das Labyrinth bilden.

Revendications

1. Séparateur de vapeurs d'huile provenant d'un carter de moteur à combustion interne (fuite des gaz) consistant en une embase (11) et un capotage, dans lequel l'embase est fabriquée par fusion en une seule pièce avec le carter (2) du moteur, de manière correspondante à l'une des parois latérales de celui-ci, et est raccordée à la chambre de vilebrequin du moteur par l'intermédiaire d'au moins un collecteur (6, 7) fabriqué par fusion dans la paroi latérale du carter, et dans lequel le capotage (13) possède une tubulure (15) pour transférer les vapeurs de fuite des gaz vers le corps de papillon du système d'alimentation du moteur, **caractérisé en ce que** le capotage (13) possède une autre tubulure (16) qui permet à l'huile fraîche de pénétrer dans le moteur.

2. Séparateur selon la revendication 1, **caractérisé en ce que** le capotage (13) et l'embase sont munis de parois internes qui sont au même niveau, et forment ainsi un labyrinthe.

3. Séparateur selon la revendication 1, **caractérisé en ce que** ladite autre tubulure est raccordée au carter d'huile du moteur, par l'intermédiaire d'un passage (18) ménagé dans le séparateur de manière correspondante au sommet pointant vers le bas, et par l'intermédiaire d'un collecteur (19) fabriqué, par fusion, en une seule pièce avec la paroi du carter (2).

4. Séparateur selon les revendications précédentes, **caractérisé en ce que** des encoches (21) permettant le passage de l'huile de décantation sont prévues dans les parois qui forment le labyrinthe.

FIG.1

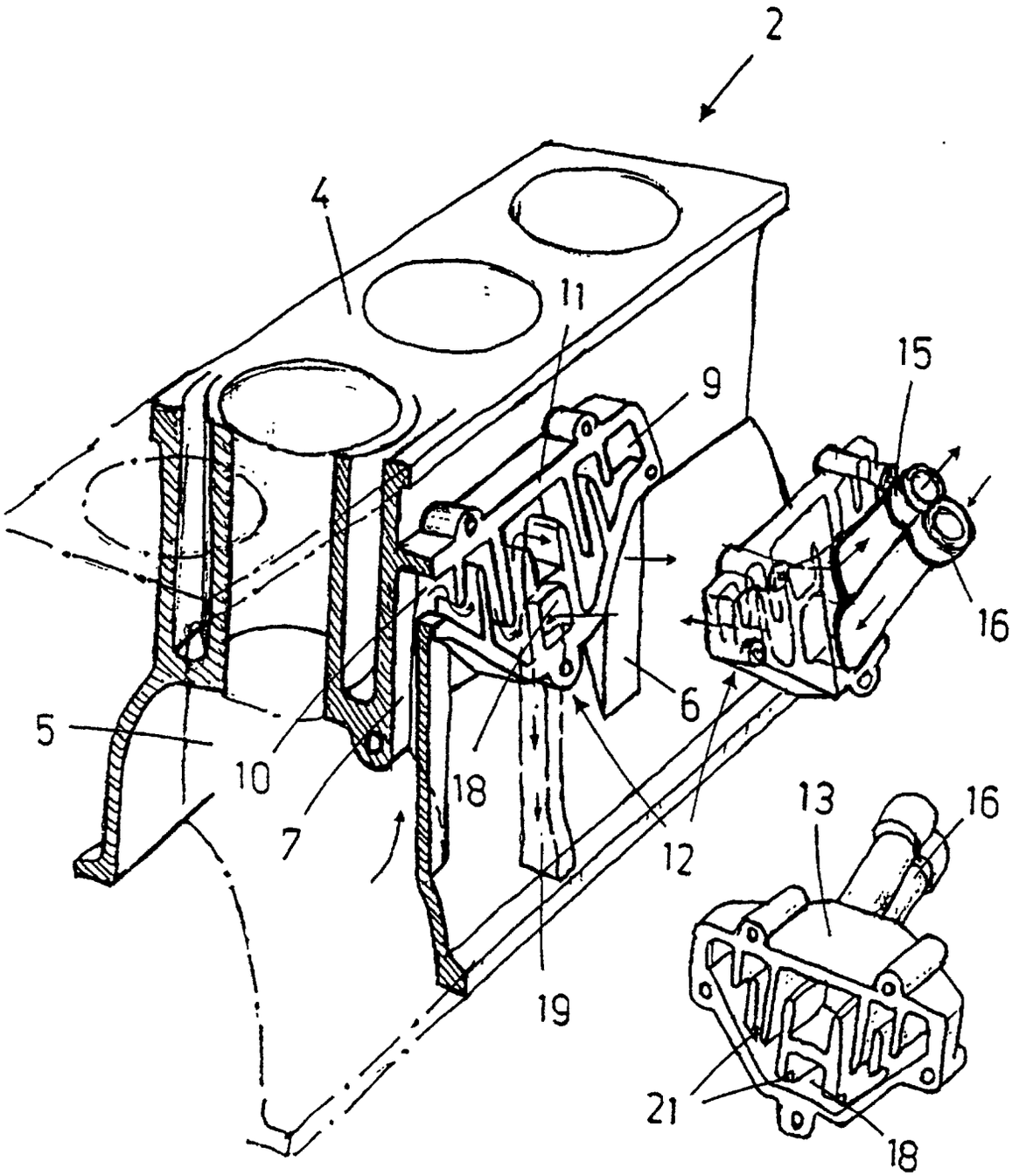

FIG.2