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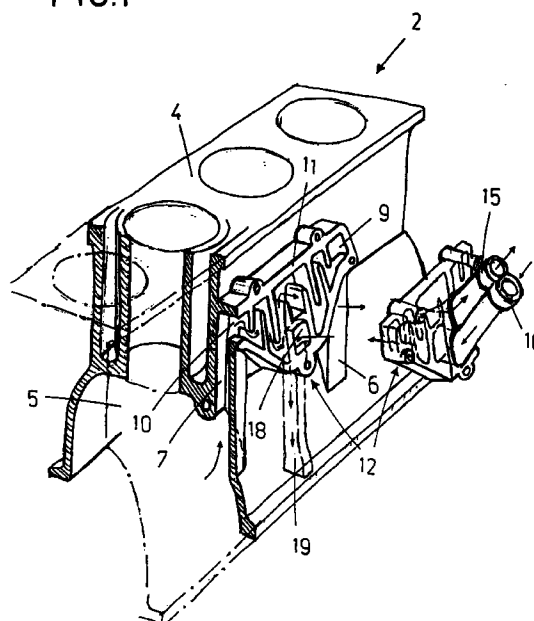
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(54) **Device for oil vapours separation from the crankcase of an internal combustion engine and connection for blow-by of said vapours**

(57) Separator for oil vapour from the crankcase of an internal engine (blow-by) consisting of a base (11) and a cover (13); the base being made by fusion, integral with the crankcase (2) of the engine, in correspondence to one of its side walls.

FIG.1



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

[0005] Said object is achieved by means of a separator for blow-by vapours presenting the characteristics indicated in claim 1.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] A few notches 21, made in the walls of the labyrinth, allow the decantation oil to return to the sump through the manifold 19.

[0011] 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.

[0012] 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.

[0013] 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 (11) and a cover (13), characterised in that the base (11), is made by means of fusion integral to the crankcase (2) of the engine in correspondence with one of its side walls.
2. Separator as claimed in claim 1 characterised in that the base (11) is basically shaped as an equilateral triangle with one vertex pointing downwards and is provided with internal walls forming a labyrinth.
3. Separator as claimed in claim 1 characterised in that the inner part of the base (11) is connected to the crank chamber of the engine through two manifolds (6, 7) made by fusion in the side wall of the crankcase.
4. Separator as claimed in claim 3 characterised in that the manifolds (6, 7) end with holes (9, 10) made in the side wall of the crankcase in correspondence with the ends of the side of the base

(11) which is basically parallel to the plane defined by the upper surface of the crankcase.

5. Separator as claimed in claim 1 and 2 characterised in that the cover (13) is provided with internal walls which form the same labyrinth as the one existing on the base (11). 5
6. Separator as claimed in claim 1 characterised in that the cover (13) presents a manifold (15) to carry the blow-by vapours to the throttle body of the engine feeding system. 10
7. Separator as claimed in claim 1 characterised in that the cover (13) presents a manifold (16) to let fresh oil into the engine. 15
8. Separator as claimed in claims 1 and 7 characterised in that said 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) 20
9. 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. 25

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FIG.1

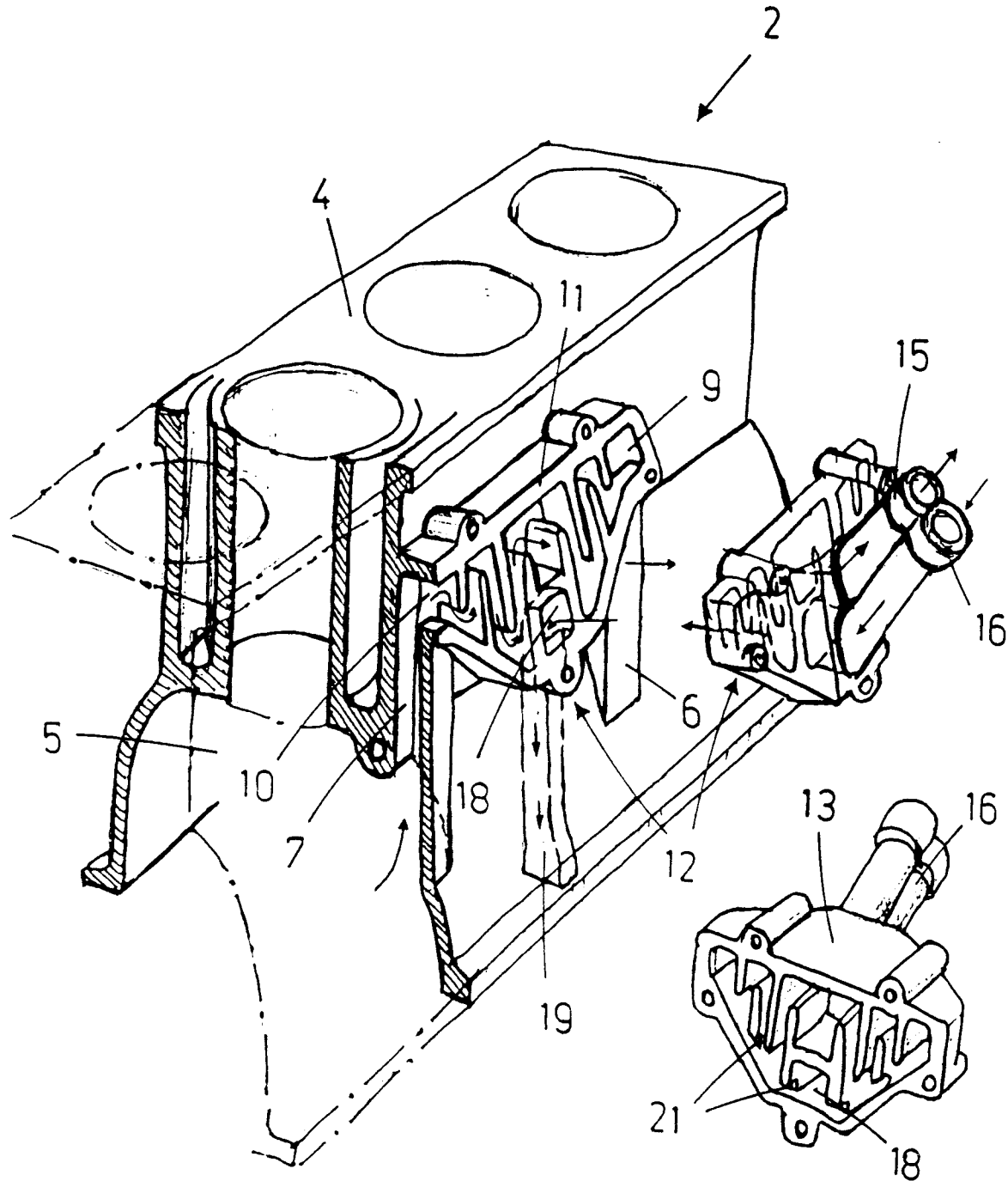
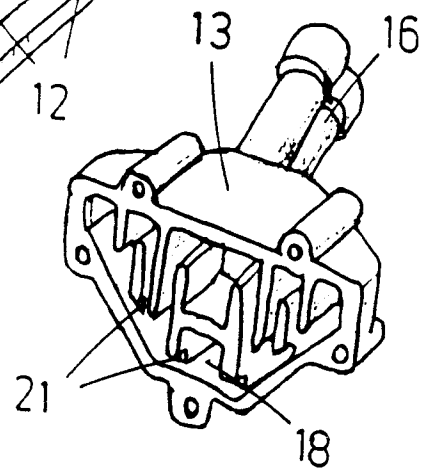


FIG.2





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EUROPEAN SEARCH REPORT

Application Number
EP 98 12 2363

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 March 1999	Examiner Mouton, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 98 12 2363

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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