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(54) System for venting oil vapour from an internal combustion engine crankcase.

(57) A system is described for venting oil vapour from the crankcase of internal combustion engines, of the type comprising a cylinder head (10) fixed to a crankcase (11) by fixing bolts (12) passing through corresponding passages (13) provided within the body of the cylinder head (10) and screwed into suitable threaded seats (14) provided in the crankcase (11). At least some of the passages (13) are provided parallel to a series of further vertical cylindrical passages (17, 18) provided through the cylinder head (10) and the crankcase (11) for the return of the oil (19) which condenses in the cylinder head (11).

At least one oil return passage (18) is connected to one of the fixing bolt passages (13) by a connection duct (20) provided within the body of the cylinder head (10).

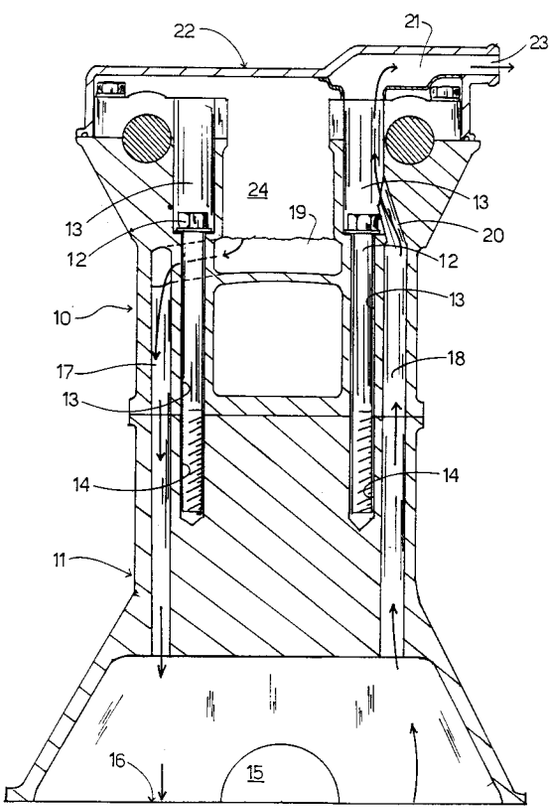

FIG.1

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This invention falls within the field of internal combustion engines, and relates in particular to a system for venting the oil vapour which forms within the crankcase or oil sump.

As is well known, oil vapour accumulates within the crankcase during the operation of internal combustion engines. To prevent its pressure reaching an unacceptable value, various venting systems have recently been devised for the purpose of evacuating the vapour from the crankcase and then conveying it in order to return it to circulation with the intake air into the combustion chamber.

Examples of these oil vapour recovery and recirculation systems are described in US patents 4,558,681, 4,502,424, 4,345,573 and 4,102,314. These patents generally comprise various ducts and channels suitably located within the engine to connect the crankcase to the cylinder head or to the intake lines, so eliminating the oil vapour pressure.

Said systems are however complicated and in particular costly to construct, the object of the present invention therefore being to provide a simple and economical system which solves the problem of excess oil vapour pressure within the crankcase without involving space requirements and costs deriving from the provision of additional parts within the engine.

This and further objects and advantages which will be more apparent hereinafter are attained according to the invention by a system for venting oil vapour from the crankcase of internal combustion engines, of the type comprising a cylinder head fixed to a crankcase by fixing bolts passing through corresponding passages provided within the body of the cylinder head and screwed into suitable threaded seats provided in the crankcase; at least some of said passages being provided parallel to a series of further vertical cylindrical passages provided through the cylinder head and the crankcase for the return of the oil which condenses in the cylinder head; characterised in that at least one oil return passage is connected to one of said fixing bolt passages by a connection duct provided within the body of the cylinder head.

The structural and operational characteristics of a preferred but non-limiting embodiment of a venting system according to the invention is described hereinafter with reference to the accompanying drawings, in which:

Figure 1 is a schematic vertical section through a modern internal combustion engine provided with the venting system according to the invention; and

Figure 2 is a schematic perspective view of the venting system of the invention, applied to an engine.

With initial reference to Figure 1, the reference numeral 10 indicates an internal combustion engine cylinder head, fixed in known manner to a crankcase 11 by fixing bolts 12 passing through corresponding passages 13 provided in the body of the cylinder head 10, and then screwed into suitable threaded seats 14 provided in the crankcase 11.

As with all internal combustion engines, the crankcase 11 houses a crankshaft, schematically indicated by 15 and shown partly immersed in an oil bath 16, which collects on the bottom of the crankcase before being again fed to other engine parts by a suitable pump (not shown) or other lubrication systems.

The passages 13 are upperly open to allow insertion of the bolts 12. The cylinder head is covered by a cover 22, which is fixed to it in the conventional manner.

Parallel to the bolt fixing passages and seats 13 and 14, the internal combustion engine comprises a series of vertical cylindrical passages 17 and 18 for the return of the oil 19 which condenses in the cylinder head 11. As schematically illustrated in Figures 1 and 2, the oil return passages 17 and 18 are provided in the periphery of the cylinder head 10 and crankcase 11 external to the fixing bolt seats 12. The passages 17 and 18 communicate upperly with a chamber 24 within the cylinder head, and lowerly with the interior of the crankcase (oil sump) containing the lubrication oil 16.

According to the invention, some of the oil return passages 18 are directly connected to the fixing bolt passages 13 closest to them by a connection duct 20, preferably cast into the cylinder head 10 and arranged slightly inclined in a vertical plane towards the interior of the cylinder head to allow easy passage of oil vapour originating from the underlying crankcase.

As can be seen in Figure 2, the connection ducts 20 are not provided for all the oil return passages 17 and 18, but only for two passages 18 positioned at two opposing vertices of the cylinder head as it is not necessary to utilize all the passages 17 and 18 in the engine to achieve the desired effect.

According to the invention, the oil vapour is collected upperly by a horizontal chamber 21 provided in the cover 22 closing the cylinder head 11. As shown schematically in Figure 2, the chamber 21 extends L-shaped along two adjacent sides of the cover 22 so that it reaches both the vertices of the cylinder head, at which the connection ducts 20 are present. The oil vapour which hence reaches the collection chamber 21 is then conveyed to a single duct 23 leaving said chamber 21 and located in an intermediate position between the two pas-

sages 13 comprising the oil vent. The vapour is returned to circulation into the intake air via the duct 23, and then fed to combustion.

In an alternative embodiment (not shown) of the venting system according to the invention, only one of the oil return passages 18 is provided with a connection duct 20 connecting it directly to the nearest passage 13 for the fixing bolt 12, and hence to the exit duct 23.

As will be apparent, the venting system according to the invention represents a simple and effective solution to the problem of excess pressure of oil vapour which, by providing a simple direct passage between the fixing bolt holes and the oil return passages, is evacuated from the crankcase without the need for costly and space-consuming additional ducts to be provided within the engine.

The invention is not limited to that described and illustrated, which is to be considered as merely illustrative of the best embodiment of the invention, which can be modified in terms of shape, dimensions, arrangement of parts and constructional and operating details. The invention embraces all modifications falling within its scope, as defined by the following claims.

Claims

1. A system for venting oil vapour from the crankcase of internal combustion engines, of the type comprising a cylinder head (10) fixed to a crankcase (11) by fixing bolts (12) passing through corresponding passages (13) provided within the body of the cylinder head (10) and screwed into suitable threaded seats (14) provided in the crankcase (11); at least some of said passages (13) being provided parallel to a series of further vertical cylindrical passages (17, 18) provided through the cylinder head (10) and the crankcase (11) for the return of the oil (19) which condenses in the cylinder head (11); characterised in that at least one oil return passage (18) is connected to one of said fixing bolt passages (13) by a connection duct (20) provided within the body of the cylinder head (10).

2. A system as claimed in claim 1, characterised in that two oil return passages (18), namely those in positions corresponding with two opposing vertices of the cylinder head (10), are connected to the adjacent bolt passages (13) by said connection ducts (20).

3. A system as claimed in claim 2, characterised in that said connection ducts (20) are arranged slightly inclined in a vertical plane towards the interior of the cylinder head (10).

4. A system as claimed in claim 1, characterised in that within the cover (22) of the cylinder head (10) there is provided an oil collection chamber (21) communicating with said connection duct (20).

5. A system as claimed in, claims 2 and 4, characterised in that said collection chamber (21) extends L-shaped along two adjacent sides of the cover (22) so as to connect with said passages (13) communicating with said connection ducts (20).

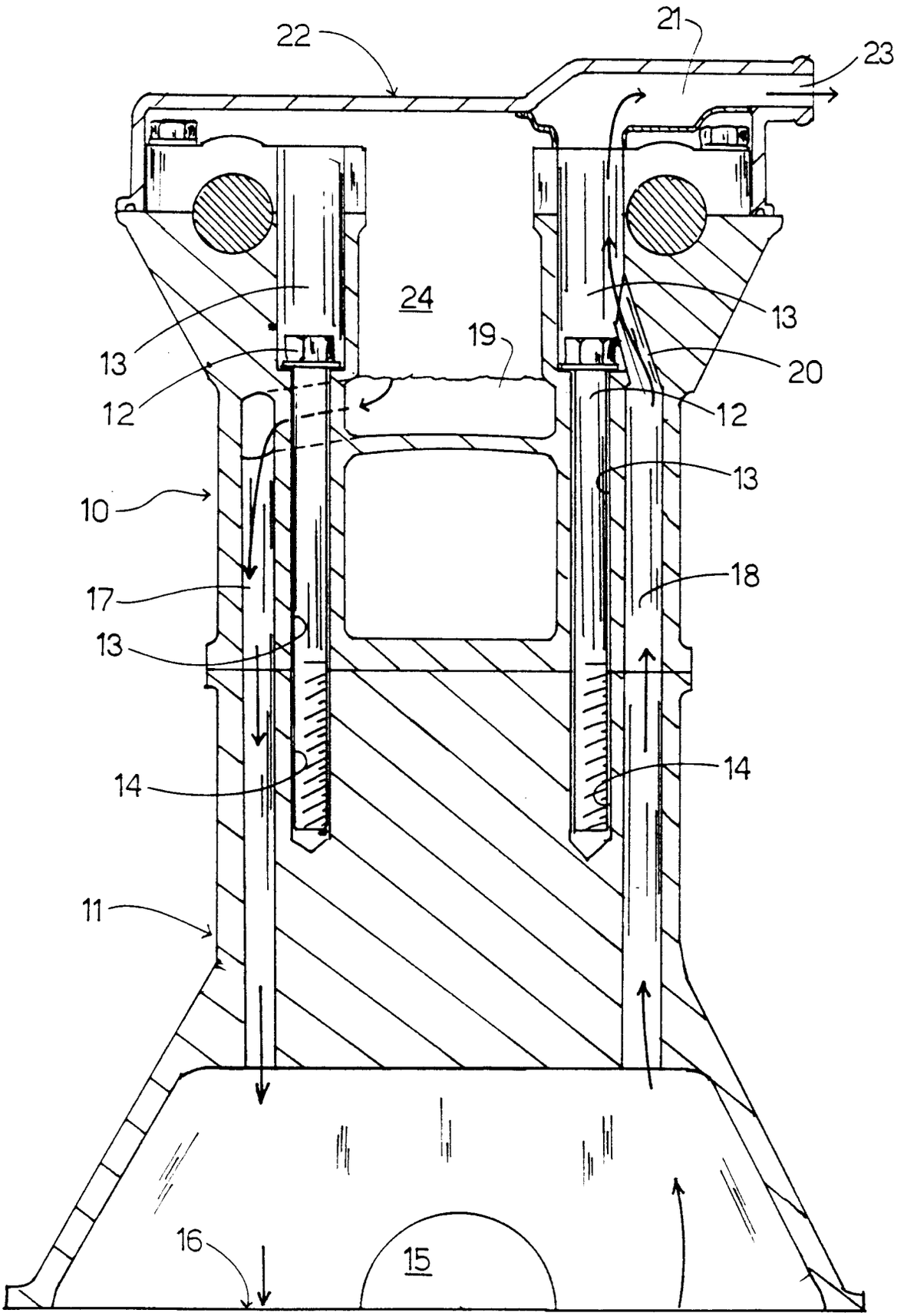

FIG.1

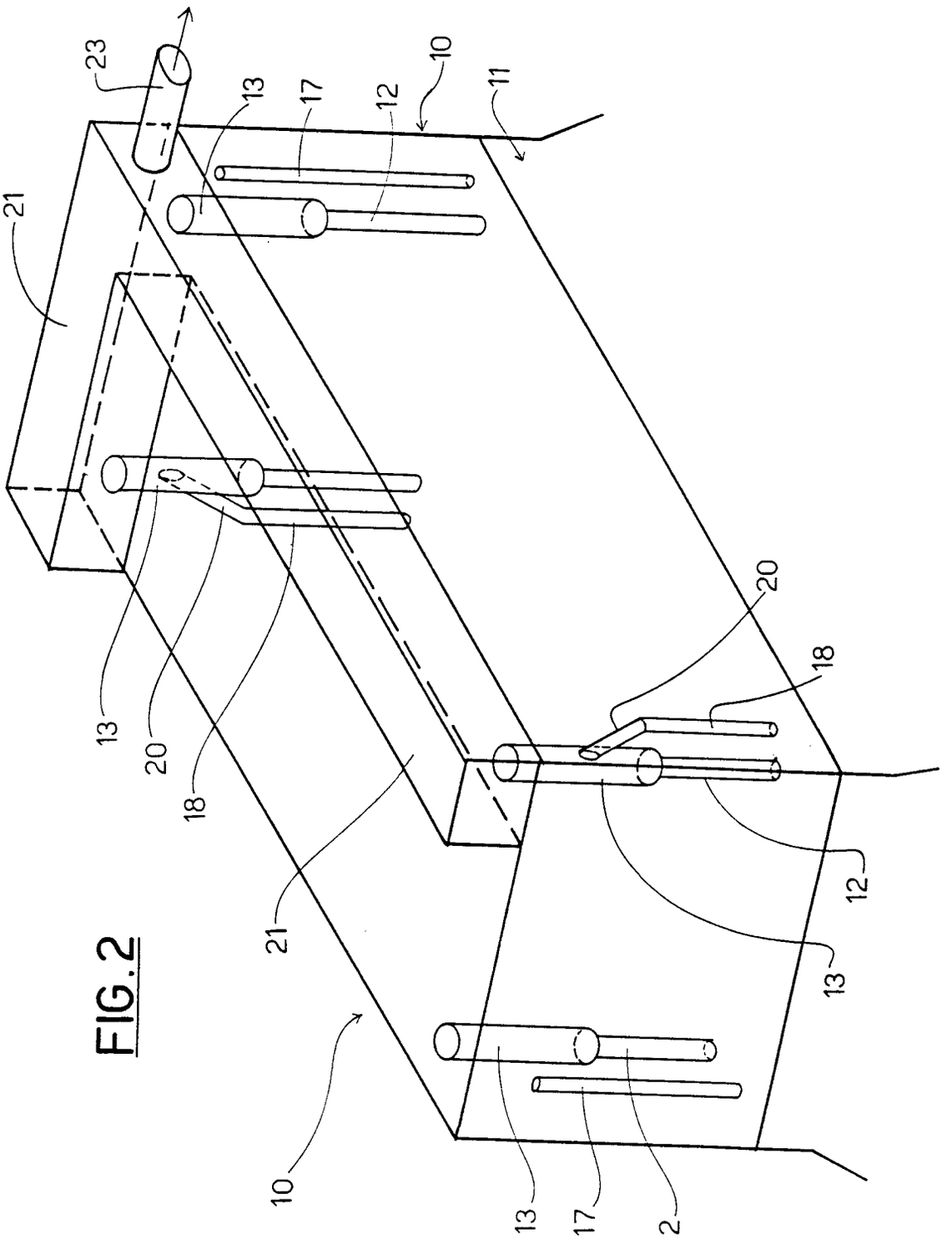

FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 4994

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 448 431 (AUTOMOBILES PEUGEOT & AUTOMOBILES CITROEN) * the whole document *	1-4	F01M13/04 F01M11/02
A	US-A-4 993 375 (AKIHIKO) * the whole document *	5	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)
F01M F02M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 January 1994	Kooijman, F

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
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