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(54) Oil suction duct for internal combustion engines

(57) A suction duct (4) for the lubricating oil in an internal combustion engine (1) of the type comprising an engine block (2) and an oil sump (3), characterized in that it comprises a flexible pipe (4), first connecting means (21) to the engine block (2) mounted at one end of said pipe (4), second connecting means (22) mounted at the opposite end of said pipe (4), and connecting means (9) between the sump (3) and said second connecting means (22).

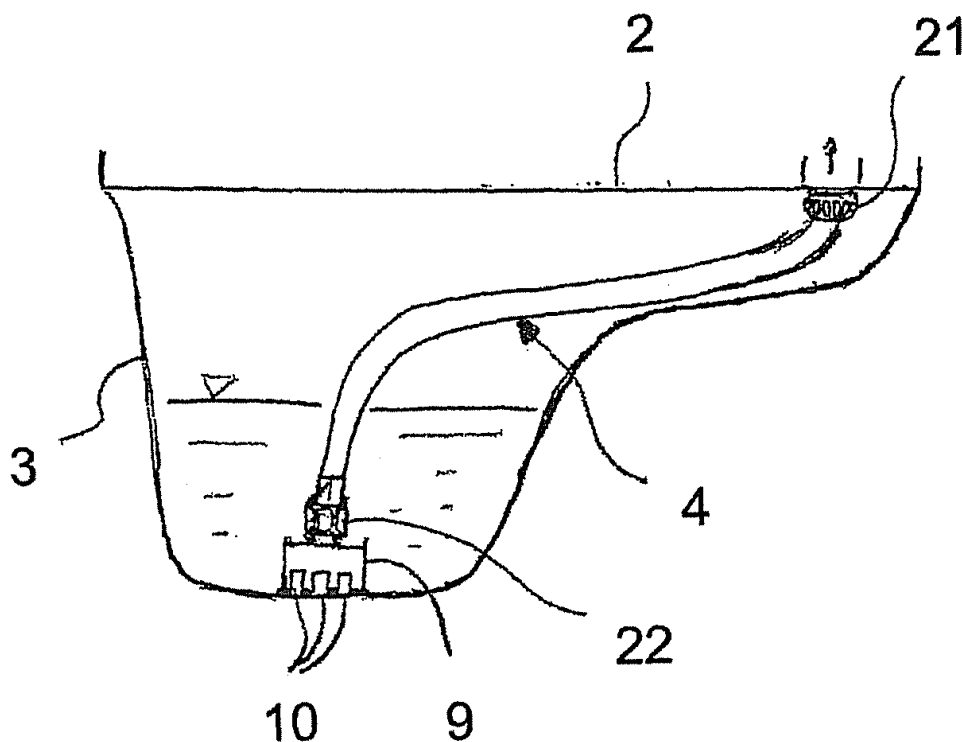


FIG. 3

Description

[0001] This invention relates to an oil suction duct for internal combustion engines and, more precisely, relates to an oil suction duct of the type designed to be installed at the bottom of the oil sump of an internal combustion engine.

[0002] In internal combustion engines, the presence of a lubricating oil pan or "sump" which is usually arranged at the bottom of the engine block, to collect and contain all of the lubricating oil, it is already known in the art. Such engines also comprise a pump driven by the engine itself that sucks the lubricating oil from the sump and delivers the same into a multiplicity of lubrication ducts where the oil is subsequently collected again into said sump.

[0003] The lubricating oil is sucked from the sump by means of a duct, i.e. the so called suction duct, that sucks in the oil from the lowest part of the sump and delivers said oil towards the pump. Said suction duct usually has a suction inlet that is arranged in proximity to the bottom of the sump to where the oil flow is directed. In order to simplify construction and reduce costs, the suction duct is a rigid structure made of low-carbon metal, and is assembled and fixed to the bottom of the engine block by means of flanges before the oil sump is assembled. Although this is a low-cost solution, it still has some drawbacks.

[0004] A first drawback consists in that the suction pipe is made of metal and is therefore a rigid structure, which means it cannot be adapted to fit different types and shapes of oil sumps that may be used as the engine is updated and/or modified. This means that during the production of one or more engine lines, the type and/or shape of the suction duct must be changed each time the shape of the oil sump is changed, while maintaining the same shape or casting of the base of the engine block, dealing to an increase of production costs.

[0005] Another drawback consists in that the suction duct is subject to strong vibrations, and being made of metal the same is also subject to mechanical fatigue, therefore the duct can easily break.

[0006] In order to overcome the aforesaid drawback, there is provided the applying of reinforcing structural members to the suction duct so that it can be anchored at several points to the bottom of the engine block, increasing its strength. However, this solution has the drawback of requiring more work to tighten the bolts or similar devices when mounting and assembling the engine.

[0007] Furthermore, the use of additional reinforcements on the suction pipe results in increasing production time and costs.

[0008] Therefore, the object of the present invention is to solve the above described drawbacks by providing a suction duct for internal combustion engines that can readily be adapted for installation on different oil sump versions.

[0009] Another object of the present invention is to provide a suction duct for internal combustion engines that is not subject to fatigue stress caused by the vibrations of the engine, thus being more reliable.

[0010] A further object of the present invention is to provide a suction duct for internal combustion engines that is easier to assemble compared to the suction duct known in the prior art.

[0011] The present invention thus provides to a suction duct for internal combustion engines according to claim 1.

[0012] A detailed description of a preferred embodiment of the suction duct according to the invention will be now provided, given as a non limiting example, with reference to the annexed drawings, wherein:

figure 1 is a schematic view of a longitudinal section of an engine block incorporating a suction duct according to the state of the art;

figure 2 is a schematic and partial view of an oil sump incorporating a suction duct according to the state of the art, and figure 3 is a schematic and partial view of an oil sump incorporating the suction duct according to this invention.

[0013] With reference now to Figure 1 there is shown an internal combustion engine block that incorporates a suction duct of the type already known in the art. Accordingly, an engine 1 comprises an engine block 2 to the bottom of which a lubricating oil sump 3 is integrally connected. Inside the sump 3 there is a suction duct 4 that is connected to the bottom of the engine block 2 of the engine 1 by means of flanges and bolts (illustrated in greater detail below).

[0014] Figure 2 shows the sump 3 and suction duct 4 of the engine of Figure 1 in greater detail. More precisely, the suction duct 4 comprises a first rigid duct 5 that is connected to the pump at the bottom of the engine block 2 by means of a flange and the relevant bolts (not illustrated). The first duct 5 is connected to a second rigid duct 6 by means of flanges 7.

[0015] When necessary, the second duct 6 has a supporting bracket 8 that is also fixed to the bottom of the engine block 2. The purpose of the bracket 8 is to increase the fatigue strength of the duct 6.

[0016] At the end of the duct 6 there is a lubricating oil suction inlet 9. The suction inlet typically incorporates a straining and filtering element to remove any solid bodies and impurities (not illustrated in the drawing).

[0017] With reference now to figure 3, a partial and schematic illustration of the suction duct according to the present invention it is shown. For the sake of clarity same parts will have same numbers.

[0018] According to the invention, the suction duct consists of a single tubular member or a pipe 4 that is flexible, and it is made of a suitable material which can be already known in the art. At the end of the pipe 4 on the side which is connected to the oil pump of the engine block 2, the pipe 4 has a fitting 21 for the removable coupling and complementary

to the suction inlet of the oil pump, the fitting 21 being a bayonet, or screw joint type or equivalent.

[0019] On the other hand, at the suction end of the pipe 4 which corresponds to the bottom of the sump 3 there is a suction inlet 9 that is rendered integral connected to the bottom of the sump 3 by means of a welding or equivalent connection. The suction inlet 9 comprises a substantially cylindrical body with a suction area having a multiplicity of openings 10 in proximity to the bottom region of the sump 3.

[0020] On top of said cylindrical body of the inlet 9 there is a fitting element 22 for the removable coupling of the pipe 4, the coupling 22 being complementary and of the bayonet or screw type or similar.

[0021] Attention must be drawn to the fact that the multiplicity of openings 10 constitute themselves an area in which any solid bodies and impurities that may have been deposited on the bottom of the sump 3 are strained or filtered to the pump.

[0022] To assemble the suction duct, first the pipe 4 is connected to the inlet 9 by means of the coupling 22. Second, the pipe 4 is connected to the suction inlet of the pump on the engine block 2 by means of the coupling 21, and at last the sump 3 is connected to the engine block 2.

[0023] The advantages of the suction pipe 4 according to this invention will be apparent to the person skilled in the art.

[0024] A first advantage consists of the fact that the suction pipe comprises a single pipe 4 and there is thus no risk of leaks or intermediate breakages that could result in loss of efficiency.

[0025] A second advantage consists of the fact that the suction pipe 4 is made of a flexible material and is thus not subject to fatigue stress that could undermine its integrity and shorten its working life.

[0026] Another advantage consists of the fact that the connection of the pipe 4 to the engine block 2 requires the use of fewer threaded connections, making connection simpler and reducing machining and assembly times.

[0027] A further advantage consists of the fact that the assembly of the suction pipe 4 and subsequent assembly of the oil sump 3 on the engine block 2 are simplified, reducing the costs and time involved.

[0028] Another advantage consists of the fact that, since the suction pipe 4 is more reliable, relevant repairs and engine maintenance operations can be carried out at longer intervals once the suction pipe is in use.

[0029] Another main advantage concerns the logistics associated with the proposed solution, whereby there are fewer parts for subsequent assembly, as the sump according to this invention is supplied with the suction pipe already assembled, and less space is required at the assembly plant, since the area at the side of the line usually taken up by the suction ducts container(s) is no longer necessary.

Claims

1. A suction duct (4) for the lubricating oil in an internal combustion engine (1) of the type comprising an engine block (2) and an oil sump (3),

characterized in that it comprises:

- a flexible pipe (4);
- first connecting means (21) to the engine block (2) mounted at one end of said pipe (4);
- second connecting means (22) mounted at the opposite end of said pipe (4); and
- connecting means (9) between the sump (3) and said second connecting means (22).

2. A suction duct (4) according to the previous claim, in which said first connecting means comprises a coupling (21) of the threaded or bayonet type or of an equivalent type.

3. A suction duct (4) according to claim 1 or 2, in which said second connecting means comprises a coupling (22) of the threaded or bayonet type or of an equivalent type.

4. A suction duct (4) according to claim 1 or 2 or 3, in which said connecting means comprises a cylindrical body (9) having a suction area having a multiplicity of openings (10) in proximity to the bottom of the sump (3).

5. A suction duct (4) according to the previous claim, in which the top of said cylindrical body (9) comprises a complementary fitting element for said coupling (22).

6. A Suction duct (4) according to any one of the previous claims, in which said connecting means (9) are integrally connected to said sump (3).

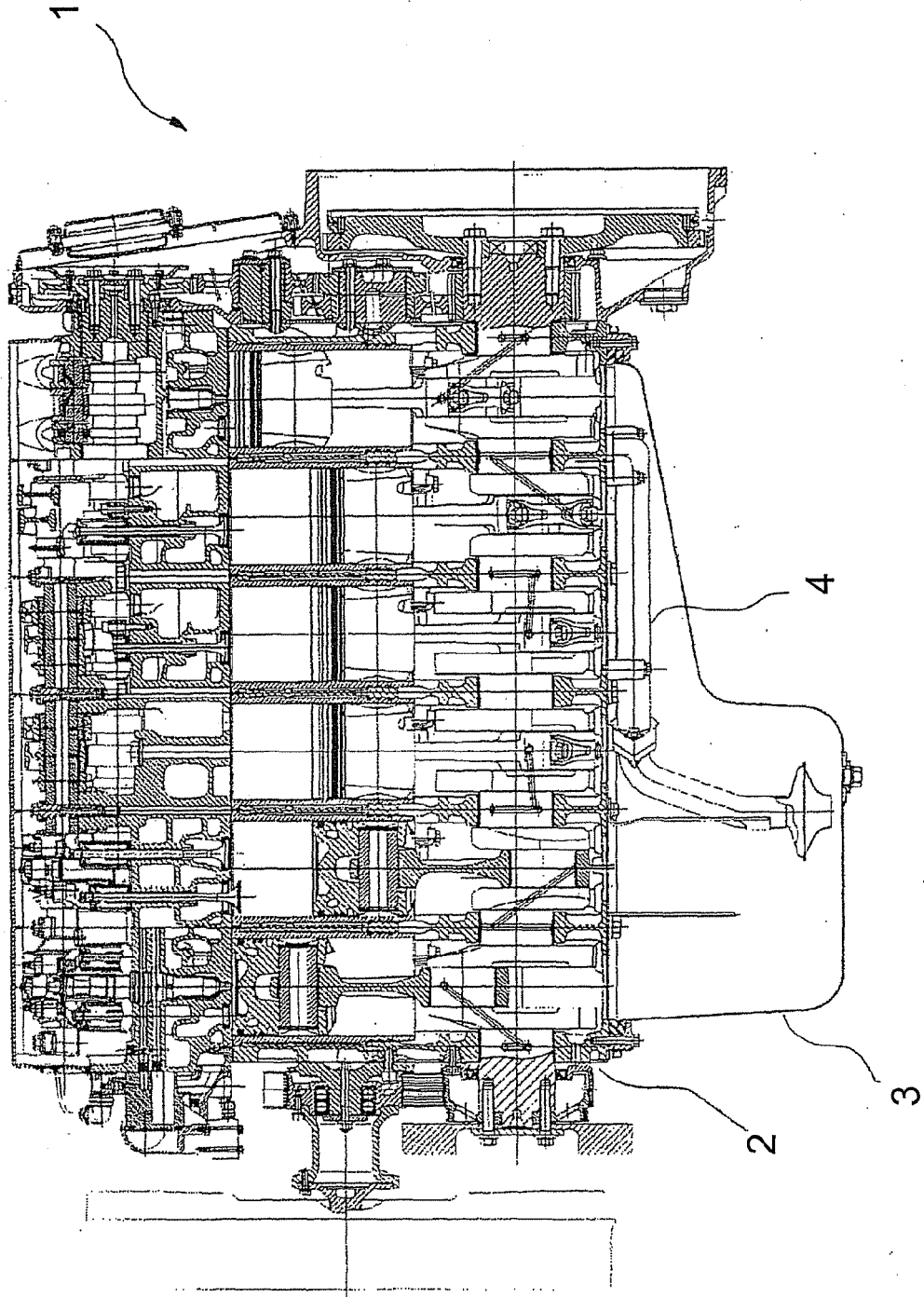


FIG. 1

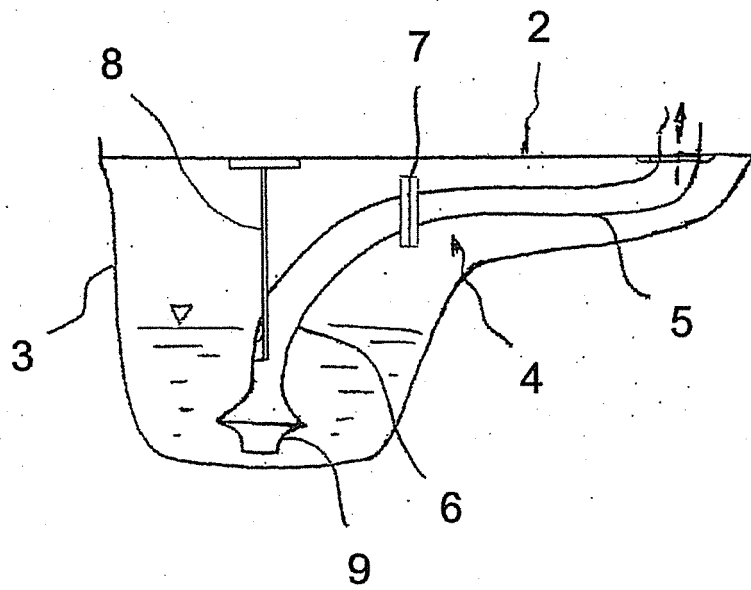


FIG. 2

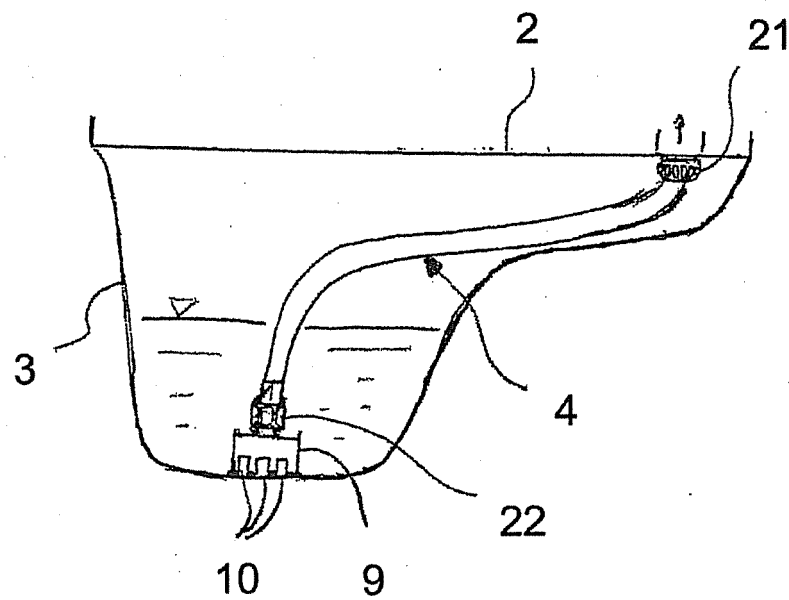


FIG. 3