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(54) **TURBOCHARGER AND CYLINDER HEAD**

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(57) **ABSTRACT**

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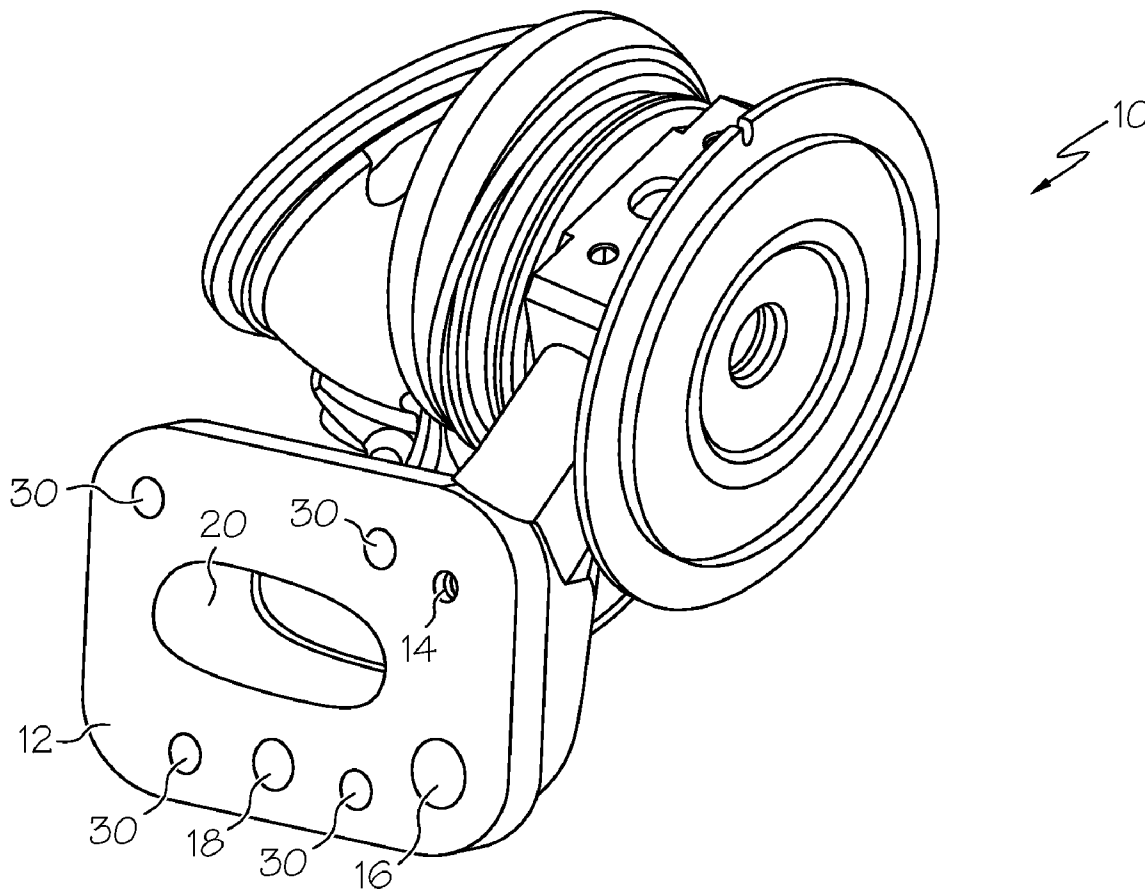
A turbocharger includes, but is not limited to a connecting flange for connection to a cylinder head. The connecting flange has at least one connecting opening for receiving a fluid line for the supply and/or removal of fluids. Further disclosed does a cylinder head comprise a connecting flange for connection to a turbocharger. The connecting flange has at least one connecting opening for receiving a fluid line for supplying and/or removing fluids. Furthermore, an engine arrangement comprising a cylinder head and a turbocharger flange-mounted to the cylinder head is provided. With these turbocharger, cylinder head, and engine arrangement, it is possible to connect a turbocharger and a cylinder head to one another, simply, rapidly, and straightforwardly.

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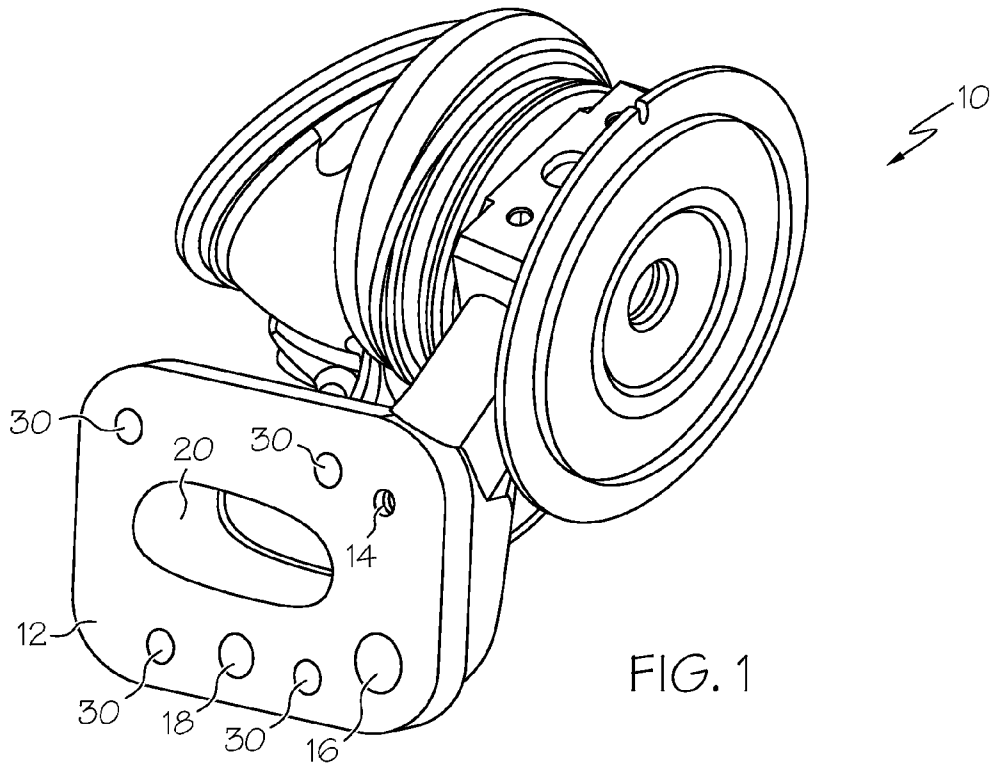


FIG. 1

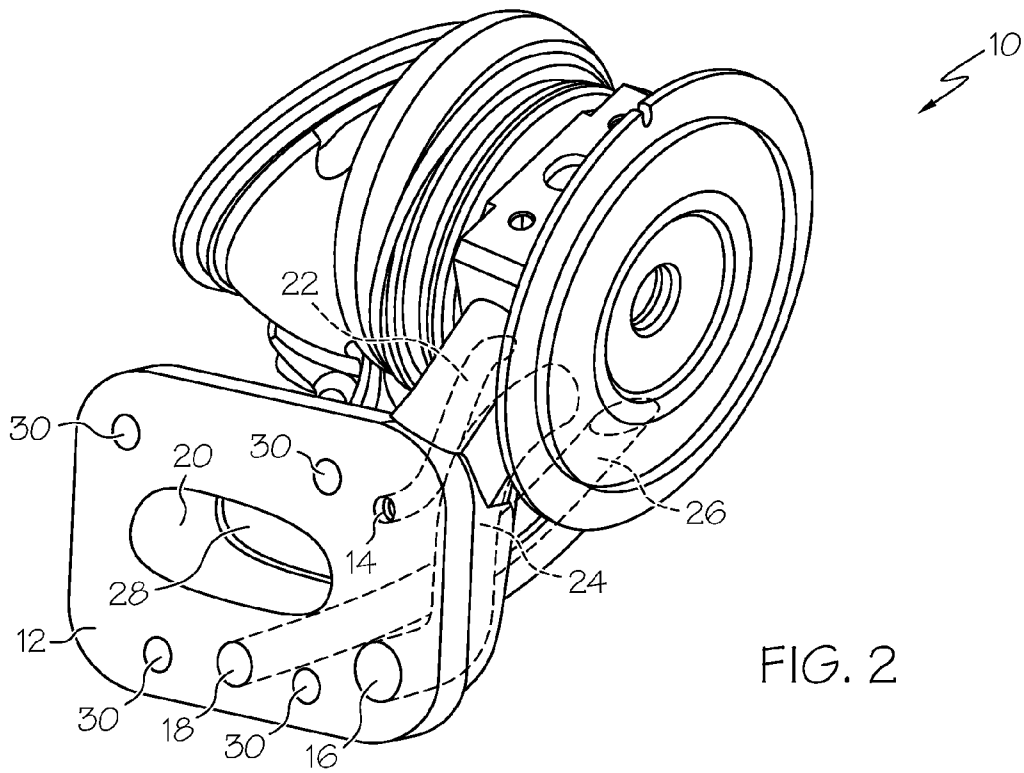


FIG. 2

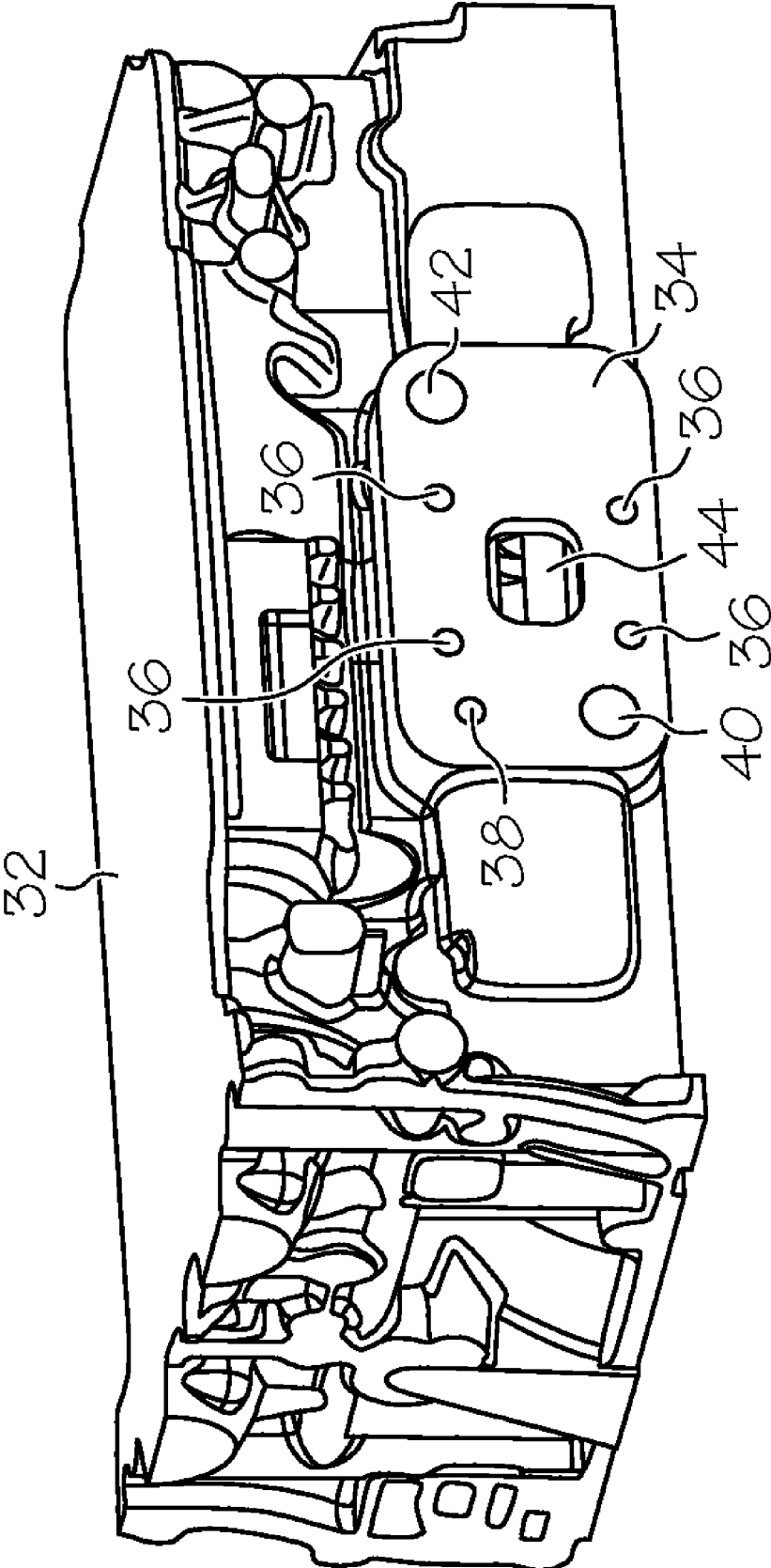


FIG. 3

TURBOCHARGER AND CYLINDER HEAD

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to German Patent Application No. 102007060397.7, filed Dec. 14, 2007, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The invention relates to a turbocharger for connection to a cylinder head and to a cylinder head for connection to a turbocharger.

BACKGROUND

[0003] An exhaust turbocharger generally has a compressor and a turbine that are connected to one another by a common shaft. In this case, the turbine, driven by the exhaust gases of the engine, delivers the drive energy for the compressor. In order to guide the exhaust gases to the turbocharger, a manifold is used before the turbocharger. Both integration of the manifold in the cylinder head and such integration of the turbocharger are sufficiently known from JP 2002303145. For the oil supply and removal and also for the water supply and removal, the fluid lines are mounted for the supply and/or removal of fluids required for this purpose by means of a plurality of assembly steps. As a result, the connection of the turbocharger to the cylinder head is on the one hand difficult, prone to error, and costly.

[0004] In view of the foregoing, it is at least one object to provide a turbocharger and a cylinder head, which may be connected to one another simply, rapidly, and straightforwardly. In addition, other objects, desirable features, and characteristics will become apparent from the subsequent summary and detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background.

SUMMARY

[0005] The at least one object, objects, desirable features, and characteristics, are achieved with a turbocharger comprising a connecting flange for connection to a cylinder head. According to an embodiment of the invention, the connecting flange has at least one connecting opening for receiving a fluid line for the supply and/or removal of fluids. The fluid may in particular be liquids or gaseous media, which may be supplied to and removed from both the turbocharger and the cylinder head via the respective fluid lines for the supply and/or removal of fluids.

[0006] Due to the at least one connecting opening for receiving a fluid line for the supply and/or removal of fluids, an overall more compact entire engine is formed. Furthermore, due to the absence of individual components such as suction pipe, exhaust manifolds, and/or other fluid lines for the supply and/or removal of fluids, interfaces or connecting elements are eliminated. On the one hand, assembly expenditure is reduced and, on the other hand, potential leakage points are minimized. In this way, the cost expenditure for assembly, disassembly, and for possible repairs is reduced appreciably. Moreover, by eliminating components and interfaces, utilization of the engine compartment is optimized and the response behavior of the turbocharger is improved due to shorter fluid lines for the supply and/or removal of fluids. As

a result, the turbocharger may be connected to the cylinder head simply, rapidly, and straightforwardly.

[0007] It is advantageously possible that the fluid lines for the supply and/or removal of fluids can be formed by the turbocharger itself. In this case, the connecting openings may form part of the fluid line for the supply and/or removal of fluids and/or be arranged in the flange connecting face. In this way, assembly is simplified. Furthermore, components and therefore costs are saved, thermodynamic advantages are achieved, and the durability's of the turbocharger and the cylinder head are improved.

[0008] In a preferred embodiment, the at least one connecting opening receives a water supply line. In this case, it proves to be an advantage that on the one hand, the temperature of the turbocharger can be sufficiently regulated by means of a water supply line integrated in the turbocharger and on the other hand, no water line is required between turbocharger and cylinder head, which needs to be additionally flange-mounted and therefore prone to leak.

[0009] In particular, the at least one connecting opening may receive a hydraulic oil line and in a particularly advantageous embodiment, a leakage-oil supply line. In this way, the oil supply and the leakage-oil supply of the turbocharger can be made from the oil passages of the cylinder head without needing to make an additional and possibly leakage-prone connection in the engine compartment.

[0010] The connecting flange advantageously has respectively one connecting opening for an outlet manifold and an inlet manifold of a cylinder head. Thus, it can be ensured that the inlet and outlet channels may be attached with only one connecting flange and assembly may take place straightforwardly and rapidly.

[0011] In a particularly preferred embodiment, the turbocharger may be secured to a cylinder head by means of the connecting flange. In this way, it is ensured that all the necessary fluid lines for the supply and/or removal of fluids of the turbocharger can be connected rapidly, simply, and straightforwardly via a connecting opening of the connecting flange to the corresponding mating parts of the fluid lines for the supply and/or removal of fluids in the cylinder head. All the feasible and necessary fluid lines for the supply and/or removal of fluids of the turbocharger may be connected to the cylinder head via the connecting flange, these including not only the aforesaid water and oil supply lines but also fluid lines for supplying and/or removing fluids for crankcase gases or similar.

[0012] The cylinder head according to an embodiment of the invention comprises a connecting flange for connection to a turbocharger. The connecting flange has at least one connecting opening for receiving a fluid line for supplying and/or removing fluids. As is also the case with the turbocharger according to an embodiment of the invention, an overall more compact entire engine is thus achieved and due to the absence of individual components such as suction pipe, exhaust manifolds, and/or other fluid lines for the supply and/or removal of fluids, interfaces or connecting elements are eliminated. On the one hand, assembly expenditure is reduced and, on the other hand, potential leakage points are minimized. Furthermore, the cost expenditure for assembly, disassembly, and for possible repairs is reduced appreciably, and by eliminating components and interfaces, utilization of the engine compartment is optimized and the response behavior of the turbocharger is improved due to shorter fluid lines for the supply

and/or removal of fluids. As a result, the turbocharger may be connected to the cylinder head simply, rapidly, and straightforwardly.

[0013] It is advantageously possible that the fluid lines for the supply and/or removal of fluids can be formed by the turbocharger itself. In this case, the connecting openings may form part of the fluid line for the supply and/or removal of fluids and/or be arranged in the flange connecting face. In this way, assembly is simplified. Furthermore, components and therefore costs are saved, thermodynamic advantages are achieved, and the durabilities of the turbocharger and the cylinder head are improved.

[0014] The at least one connecting opening advantageously receives a water supply line with the aid whereof the temperature balance of the cylinder head may be actively supported and controlled without laying an additional leak-prone water line to be flange-mounted between turbocharger and cylinder head. Furthermore, the water supply line ensures sufficient cooling of the cylinder head.

[0015] In a particularly preferred embodiment, the at least one connecting opening receives a hydraulic oil line and a further advantageous embodiment, a leakage-oil supply line. In this way, the oil and leakage oil supply of the turbocharger is provided from the oil passages of the cylinder head without providing an additional and possibly leak-prone connection in the engine compartment.

[0016] The connecting flange may preferably have respectively one connecting opening for an outlet manifold and an inlet manifold of a cylinder head. In this context, the inlet and outlet channels can be drawn toward the connecting flange in such a manner that they combine within the cylinder head in their respective collectors. In this way, only one connecting flange would be provided for inlet and outlet channel and the utilization of the engine compartment will be optimized due to the lower volume.

[0017] The engine further relates to an engine arrangement comprising an aforesaid cylinder head and a turbocharger flange-mounted to the cylinder head. By using a turbocharger according to an embodiment of the invention with a cylinder head according to an embodiment of the invention, it is possible to connect all the fluid lines for the supply and/or removal of fluids, which lie between these two components, by means of a single rapid, straightforward, and simplified assembly since only a single joining direction needs to be adhered to.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The present invention will hereinafter be described in conjunction with the following drawing figures, wherein like numerals denote like elements, and:

[0019] FIG. 1 shows a schematic perspective view of a turbocharger according to an embodiment of the invention;

[0020] FIG. 2 shows a schematic perspective see-through view of a turbocharger according to an embodiment of the invention with highlighted fluid lines for the supply and/or removal of fluids; and

[0021] FIG. 3 shows a schematic perspective view of a cylinder head according to an embodiment of the invention;

DETAILED DESCRIPTION

[0022] The following detailed description is merely exemplary in nature and is not intended to limit application and uses. Furthermore, there is no intention to be bound by any

theory presented in the preceding background and summary or the following detailed description.

[0023] The turbocharger **10** shown in FIG. 1 and FIG. 2 has a connecting flange **12** with a plurality of connecting openings **14, 16, 18, 20**. The connecting openings **14, 16, 18, 20** may either each receive a fluid line **22, 24, 26, 28** for the supply and/or removal of fluids or these are formed by the turbocharger **10**. In this context, the fluid lines **22, 24, 26, 28** for the supply and/or removal of fluids may be, for example, lines for a sufficient cooling water supply, a hydraulic oil supply line **22**, removal of leakage oil, removal of exhaust or a crankcase gas supply of the turbocharger **10**. In the embodiment shown, the connecting opening **14** receives the hydraulic oil supply line **22**, the connecting opening **16** receives the leakage oil removal line **24**, the connecting line opening receives the water supply line **26** and the connecting opening **20** receives the exhaust supply line **28**. The turbocharger **10** according to an embodiment of the invention can be connected via the connecting flange **12** and a connecting flange **34** of a cylinder head **32** according to an embodiment of the invention. For this purpose, the connecting flange **34** of the cylinder head **32** has corresponding connecting elements **36**.

[0024] It can be further seen in FIG. 3 that the connecting flange **34** of the cylinder head **32** has a plurality of connecting openings **38, 40, 42, 44** integrated in the flange connecting face. The connecting openings **38, 40, 42, 44** can either each receive a fluid line **22, 24, 26, 28** for the supply and/or removal of fluids or these are formed by the cylinder head **32**. The connecting openings **14, 16, 18, 20** of the turbocharger **10** form the corresponding mating pieces to the connecting openings **38, 40, 42, 44** of the cylinder head **32** so that when a flanged connection of the turbocharger **10** to the cylinder head **32** is made, the connecting flange **12** with the connecting flange **34** and the connecting openings **14, 16, 18, 20** of the turbocharger **10** with the connecting openings **38, 40, 42, 44** of the cylinder head **32** lie coincidentally one above the other in such a manner that the fluid lines **22, 24, 26, 28** for the supply and/or removal of fluids may be guided through the connecting openings **14, 16, 18, 20, 38, 40, 42, 44** or the fluid lines **22, 24, 26, 28** for the supply and/or removal of fluids are formed directly by the cylinder head **32** and the turbocharger **10**.

[0025] Since only one joining direction needs to be adhered to for mounting the turbocharger **10** on the cylinder head **32**, all the fluid lines **22, 24, 26, 28** for the supply and/or removal of fluids, which lie between the turbocharger **10** and the cylinder head **32**, can be connected rapidly, simply, and straightforwardly to one another. In this way, the utilization of the engine compartment volume is optimized and the response behavior of the turbocharger **10** is improved by the shorter lines **22, 24, 26, 28** for the supply and/or removal of fluids.

[0026] While at least one exemplary embodiment has been presented in the foregoing summary and detailed description, it should be appreciated that a vast number of variations exist. It should also be appreciated that the exemplary embodiment or exemplary embodiments are only examples, and are not intended to limit scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing an exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents.

What is Claimed is:

1. A turbocharger comprising:
a cylinder head;
a connecting flange adapted to connect to the cylinder head; and
at least one connecting opening of the connecting flange for receiving a fluid line.
2. The turbocharger according to claim 1, wherein the at least one connecting opening receives a water supply line.
3. The turbocharger according to claim 1, wherein the at least one connecting opening receives a hydraulic oil line.
4. The turbocharger according to claim 1, wherein the at least one connecting opening receives a leakage-oil removal line.
5. The turbocharger according to claim 1, wherein the connecting flange has a one connecting opening for an outlet manifold and an inlet manifold of the cylinder head.
6. The turbocharger according to claim 1, wherein the turbocharger is secured to the cylinder head with the connecting flange.
7. A cylinder head, comprising:
a turbocharger;
a connecting flange for connection to the turbocharger, wherein the connecting flange has at least one connecting opening for receiving a fluid line for a fluid.
8. The cylinder head according to claim 7, wherein the at least one connecting opening receives a water supply line.
9. The cylinder head according to claim 7, wherein the at least one connecting opening receives a hydraulic oil line.
10. The cylinder head according to claim 7, wherein the at least one connecting opening receives a leakage-oil removal line.
11. The cylinder head according to claim 7, wherein the connecting flange has a connecting opening for an outlet manifold and an inlet manifold of the cylinder head.

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