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(54) **Thermostat housing for internal combustion engine**

Thermostatgehäuse für eine Brennkraftmaschine

Boîtier d'un thermostat pour un moteur à combustion interne

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EP 0 750 099 B1

Description

BACKGROUND OF THE INVENTION:

[0001] This invention relates to an internal combustion engine, comprising a main body with a thermostat housing fitted thereto. More particularly, the present invention relates to a thermostat housing for an internal combustion engine which can be assembled integrally with an oil cooler, an oil filter, and so forth.

[0002] To accomplish higher performance of automobiles, the reduction of the size and the weight of internal combustion engines for automobiles has been required more and more in recent years, whereas it has become more and more difficult to secure the installation space for apparatuses outside the engine with a decreasing size of an engine main body, and the reduction of the size of the engine main body has almost reached its limit.

[0003] Particularly, a thermostat housing, an oil cooler and an oil filter each require external pipings for causing necessary cooling water and oil to flow between their devices and the engine main body and between the oil cooler and the oil filter, and for this reason, the space for a cooling water system and an oil system to be assembled outside the engine main body becomes wide.

[0004] In this aspect, an oil cooler equipped with an oil filter, which is an integrated unit of an oil filter and an oil cooler, is certainly helpful to reduce the installation space, as described, for example, in Japanese Utility Model Laid-Open No. 102413/1989. However, a further reduction of the installation space is necessary in order to realize a compact and high performance internal combustion engine.

[0005] DE-42 11 896 A1 discloses an embodiment in which the temperature control valve and the oil cooler are set in a structural body provided between the engine main body and pulleys for transmitting driving force to the cooling water pump. This arrangement is fitted to the engine body using several flanges.

[0006] US 4032068 A discloses (figures) a thermostat housing with a first flange e.g. 15 suitable for fitting said thermostat housing to an internal combustion engine main body and a second flange 12 suitable for connection to a conduit for guiding cooling water to a heat-exchanger when the temperature of water is high or a second flange 13 is suitable for connection to a conduit for circulating water directly to a heat generating part when the temperature of water is low, the first flange 15 and the second flange 12 or 13 crossing each other in extensions of their flange surfaces, an arrangement being made such that a passage from the first flange 15 to the second flange 12 permits the cooling water to flow from an inlet to the heat-exchanger, while a passage from the first flange 15 to the second flange 13 permits the cooling water to flow from the inlet to a by-pass.

SUMMARY OF THE INVENTION:

[0007] In view of the problems described above, the object of the present invention is to provide a thermostat housing for an internal combustion engine which can reduce the installation space and can improve the maintainability by integrally assembling an oil cooler or an oil filter with a thermostat housing.

[0008] The object of the present invention describes an arrangement according to claim 1.

[0009] The oil cooler and the oil filter can be assembled integrally with each other and this assembly can be fitted to the thermostat housing.

[0010] The oil flow passage formed on the thermostat housing can be opened to the first flange surface and to the second flange surface described above.

[0011] It is further possible to provide two oil flow passages in such a way that one of them can be used as a passage for introducing at least a part of a pressurized oil supplied from an oil pump to the oil cooler or to the oil filter, and the other can be used as a passage for introducing at least a part of the oil flowing out of the oil cooler or the oil filter to the engine main body.

[0012] A cooling water lead-in passage and a cooling water lead-out passage are formed in the thermostat housing. In this case, at least two cooling water lead-in passages are formed in such a fashion that one of them communicates with a cooling water jacket of the engine main body and the other, with a water passage for communication of the cooling water jacket with a radiator, a cooling water gallery communicating with the cooling water outlet side of the thermostat is formed in the thermostat housing, and a cooling water lead-out passage communicating with at least the cooling water pump suction side is formed in this cooling water gallery.

[0013] The thermostat housing can be made of an aluminum alloy. In this case, since the aluminum alloy has a high heat transfer coefficient, when the oil passage and cooling water lead-out passage are arranged near to each other in the thermostat housing, the oil is cooled at the place where they are adjacent to each other. In this way, the thermostat housing can be allowed to function as an auxiliary oil cooler.

[0014] Two-valve type thermostats such as a bottom bypass type, a side bypass type, etc, using an oil pellet which has been conventionally used, can be used as the thermostat described above.

[0015] Various conventional oil coolers can be used as the oil cooler described above such as a water cooling type oil cooler and an air cooling type oil cooler in terms of the cooling system, and a tubular type and a stack type in terms of the structure. The oil filter may be of a conventional type such that the filter paper is shaped into a cylinder so as to enlarge the filtration area.

[0016] The means for forming the first flange for fitting the thermostat housing to the engine main body and the second flange for fitting the oil cooler or the oil filter in such a fashion that the extension surfaces of their flange

surfaces cross each other, and for forming at least one oil flow passage communicating with the oil cooler or the oil filter in the thermostat housing, is allowed to function in the following way.

[0017] In other words, the thermostat housing is allowed to function as a bracket for fitting the oil cooler or the oil filter and the oil pipings thereto so as to reduce the installation space to the engine main body, the size of the engine main body, the space for the external piping of the engine main body, and the number of necessary components. Moreover, because the maintenance work of the thermostat, the oil filter, etc, can be carried out at the same position, the efficiency of the work can be improved.

[0018] The means for opening the oil passages, formed in the thermostat housing, to the first flange surface and to the second flange surface makes it possible to simultaneously carry out fitting of the apparatuses and the piping work. Therefore, the number of components of the pipings can be reduced and the efficiency of the assembly work can be improved.

[0019] Further, the means for forming two oil passages in the thermostat housing so as to use one of them as a passage for leading at least a part of the pressurized oil supplied from the oil pump to the oil cooler or to the oil filter and the other as a passage for leading at least a part of the oil flowing out of the oil cooler or the oil filter to the engine main body can further reduce the number of components and can improve the efficiency of the assembly work.

[0020] The means for forming at least two cooling water lead-in passages so as to allow one of them to communicate with the cooling water jacket of the engine main body and the other with the water passage which in turn communicates with the cooling water jacket and the radiator, for forming the cooling water gallery communicating with the cooling water outlet side of the thermostat, and for allowing this cooling water gallery to communicate with at least the cooling water pump suction side, can reduce the number of components of the cooling water piping and can improve the efficiency of the assembly work.

[0021] The means for disposing the oil passage and the cooling water lead-out passage in such a manner as to be adjacent to each other in the thermostat can allow the thermostat housing to function as the oil cooler. When the thermostat housing is made of an aluminum alloy having a high heat transfer coefficient, the thermostat housing can be allowed to function as the oil cooler.

BRIEF DESCRIPTION OF THE DRAWINGS:

[0022]

Fig. 1 is a perspective view showing the state where a thermostat housing, an oil cooler and an oil filter are fitted to an internal combustion engine by conventional means, and explaining the basic construction of a cooling water system and an oil system;

Fig. 2 is a perspective view for explaining the overall construction of a system using the thermostat housing of an internal combustion engine according to Embodiment 1 of the present invention;

Fig. 3 is a diagram showing the cooling water system and the oil system in the embodiment shown in Fig. 2;

Fig. 4 is a top view of the thermostat housing shown in Fig. 2;

Fig. 5 is a front view of the thermostat housing shown in Fig. 2;

Fig. 6 is a side view of the thermostat housing shown in Fig. 2;

Fig. 7 is a rear view of the thermostat housing shown in Fig. 2;

Fig. 8 is a bottom view of the thermostat housing shown in Fig. 2;

Fig. 9 is a sectional view taken along line IX - IX of Fig. 5;

Fig. 10 is a sectional view taken along line x - X of Fig. 5;

Fig. 11 is a sectional view taken along line **XI - XI** of Fig. 4;

Fig. 12 is a sectional view taken along line **XII - XII** of Fig. 4; and

Fig. 13 is a partial sectional view of the thermostat housing an internal combustion engine according to Embodiment 2 of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] An example of a cooling water system and an oil system of a thermostat housing, an oil cooler and an oil filter will be explained with reference to an example of the prior art shown in Fig. 1 before the preferred embodiments of the present invention are explained in detail.

[0024] In Fig. 1, cooling water discharged from a cooling water pump 2 fitted to a fan shaft (not shown) inside an internal combustion engine cools the inside of an engine main body 3, then branches into an external piping a for a thermostat housing 4 of the engine main body 3, an external piping b for a radiator 5 and an external piping c for an oil cooler 6, flows through a return external piping a' for the thermostat housing 4, a return external piping b' for the radiator 5 and a return external piping c' for the oil cooler 6, and is sent back to the cooling water pump 2. Though cooling water is distributed to a heater for air-conditioning, a turbo charger, an injection pump, etc, besides the members described above, Fig. 1 shows only the basic cooling water system.

[0025] On the other hand, the oil sent from an oil pump 7 fitted to a crank shaft (not shown) is sent to the oil cooler 6 through an external piping α, then sent to an oil filter 8 through an external piping β, next sent to an oil

gallery (not shown) disposed in the engine main body 3 through an external piping γ, sent back to an oil pan 9 after lubricating and cooling part of the engine and is again sucked into the oil pump.

[0026] Since the thermostat (not shown) and the oil filter 8 are components which need maintenance, a space for the maintenance operation must be secured when their installation space is secured. In other words, they exert great influences on the layout of other components. As the system becomes greater in scale, the number of necessary components increases, too, and the problems such as the increase of the cost and the drop of the working efficiency at the time of maintenance occur.

[0027] In contrast, the thermostat housing according to Embodiment 1 of the present invention shown in Figs. 2 and 3 can reduce the number of external pipings round the internal combustion engine and the number of components connected to them, and can improve the maintainability, as will be explained below.

[0028] As shown in Figs. 2 and 3, in the thermostat housing 4 according to Embodiment 1, a first flange F to be fitted to the engine main body 3 and a second flange G to be fitted to the oil cooler 6 are formed. In this Embodiment 1, the first flange F and the second flange G are formed in such a fashion that their faces orthogonally cross each other (see Figs. 4 and 7). The first flange F is fitted to a flange F' on the engine side which is formed on a cylinder body 10, while a flange G' on the oil side of the oil cooler 6 is fitted to the second flange G. Incidentally, the angle described above can be set to an arbitrary angle other than the right angle.

[0029] In Embodiment 1, the oil filter 8 is fitted to the oil cooler 6 so that the thermostat housing 4, the oil cooler 6 and the oil filter 8 can be integrally assembled. The oil cooler 6 used in Embodiment 1 is a conventional oil cooler which uses a cylindrical stack type water cooling type cooler element, and the oil filter 8 is also a conventional oil filter using a filter element obtained by cylindrically shaping the filter paper.

[0030] Bolt holes 11 shown in Fig. 2 are used for fastening the first flanges F and F'. Fastening of the second flanges G and G' and fastening of the oil cooler 6 and the oil filter 8 are achieved by meshing one stud bolt 12, which has a through-hole bored therein for the passage of the oil, with a female screw 12a (Fig. 12) bored at an open portion of an oil flow passage γ" and a female screw (not shown) bored at an oil outlet of the oil filter 8.

[0031] The cooling water and oil circulation system according to Embodiment 1 uses the fundamentally the same system explained with reference to Fig. 1. Therefore, same reference numerals are used and the repetition of explanation will be omitted.

[0032] The thermostat housing 4 of Embodiment 1 is produced by aluminum alloy casting, and its outline will be explained, by contrasting Fig. 2 showing the assembling step with Fig. 3 showing the system section.

[0033] The cooling water outlet J' and the cooling water inlet K' of the engine main body 3 used in this Embodiment 1 are opened in the proximity of the engine side flange F', and the oil outlet L' and the oil inlet M' are opened in the proximity of the engine side flange F' surface. As shown in Fig. 3, the cooling water outlet J' communicates with the cooling water passage 15 through which the cooling water pump 2 fitted inside the engine main body 3 circulates cooling water to the cylinder body 10, while the cooling water inlet K' communicates with the suction side of the cooling water pump 2.

[0034] Further, the cooling water outlet J' communicates with the cooling water inlet J of the oil cooler 6 through the external piping c. On the other hand, the oil outlet L' opening to the engine main body 3 communicates with the discharge side of the oil sucked from the oil pan 9 by the oil pump 7 fitted inside the engine main body 3. The oil inlet M' communicates with the oil gallery (not shown) of the cylinder body 10 through the oil flow passage γ' formed inside the engine main body 3.

[0035] On the other hand, cooling water flowing out of the cooling water outlet N' of the cylinder head 14 branches into the external piping a which bypasses the radiator 5 and the external piping b communicating with the radiator 5. The external piping a communicates with the cooling water inlet N of the thermostat housing 4, and the return external piping b' from the radiator 5 communicates with the cooling water inlet P of the thermostat housing 4.

[0036] The cooling water outlet Q of the oil cooler 6 communicates with the cooling water inlet R of the thermostat housing 4 through the external piping d. In a modified example of Fig. 3, the cooling water outlet Q and the cooling water inlet R can be connected in advance by fastening the second flange G and the oil cooler side flange G'.

[0037] Further, an external piping e (not shown in Fig. 2) for supplying cooling water to the heater 16 for air-conditioning is branched from the external piping a communicating with the cooling water outlet N' of the cylinder head 14,and its return external piping e' communicates with the cooling water inlet S of the thermostat housing 4.

[0038] In Fig. 3, radiator bypass cooling water (cooling water after cooling the engine) supplied to the cooling water inlet N of the thermostat housing 4 and radiator outlet cooling water supplied to the cooling water inlet P are supplied to the thermostat 17. A bottom bypass type thermostat one of the valves of which moves in a closing direction when the other of which moves in an opening direction is used as this thermostat 17.

[0039] When the temperature of the bypass cooling water (cooling water supplied from the cooling water inlet N) is below the set temperature of the thermostat, a wax undergoes contraction and the bypass cooling water flows into the thermostat chamber 18 of the thermostat 17. When the temperature of engine cooling water after cooling engine rises above the set temperature, the wax undergoes expansion until the cooling water tem-

perature falls below the set temperature, so that the radiator outlet cooling water (cooling water supplied from the cooling water inlet P) flows into the thermostat chamber 18.

[0040] The thermostat chamber 18 communicates with the cooling water gallery 19 inside the thermostat: housing. Therefore, cooling water flowing into the thermostat chamber 18 flows in a direction indicated by arrows in Fig. 11, joins cooling water flowing from the cooling water inlet R (cooling end water of the oil cooler 6) and from the cooling water inlet S (water out of the heater 16 for air conditioning) (see Figs. 10 and 11). The confluent cooling water flowing out from the cooling water outlet K is supplied to the cooling water inlet K' opening to the engine main body 3 through an external piping a', and sent back to the cooling water pump 2.

[0041] On the other hand, the oil supplied from the oil pump 7 (Fig. 3) flows through the oil flow passage α' inside the engine main body 3, the oil outlet L', the oil inlet L the oil flow passage α'' inside the thermostat housing 4, and supplied to the oil cooler 6 through a ring-like groove 22 made in the flange G. The oil leaving the cooler element 6a is supplied through the oil flow passage β'' to the oiler filter 8.

[0042] The oil thus supplied to the oil filter 8 is filtrated by the filter element 8a, then flows through the oil flow passage γ'', the oil outlet M', the oil inlet M' and the oil flow passage γ' (see Fig. 3) inside the engine main body 3, and supplied to the oil gallery (not shown) inside the engine main body 3.

[0043] The internal construction of the thermostat housing explained above will be explained further with reference to Figs 4 to 11, contrasting them with Figs. 2 and 3. Incidentally, the correspondence between Figs. 2 and 3 for explaining the system and its function and Figs. 4 to 11 can be confirmed by the reference numerals denoting the open portions and the flow passages.

[0044] Incidentally, as can be understood from Fig. 2, the openings of the outlets/inlets of cooling water and oil of the thermostat housing 4 face towards various directions. These directions are determined by the overall layout of the engine, and the positional relation of each opening other than the first and second flanges F and G change depending on the given situation. The thermostat housing 4 is ordinarily produced by aluminum alloy casting and has a complicated outer shape so as to reduce its thickness.

[0045] Therefore, though the directions of the openings and the outer shape are technically important, they are not essential to the present invention. Accordingly, the following explanation will be directed to only the structural relation between each cooling water outlet/inlet and the thermostat 17 and the cooling water gallery 19 and the relation between the oil outlet/inlet and the oil flow passage and the cooling water passage inside the thermostat housing 4. The outer shape of the thermostat housing 4 can be appreciated from Figs. 4 to 8 and its internal structure, from Figs. 9 to 11.

[0046] The bottom bypass type thermostat 17 is fitted to the cooling water inlet P as shown in Fig. 9. In other words, as shown in Fig. 9, the thermostat 17 is fitted to the flange 25 of the cooling water inlet P fixed to a valve seat 24 having a valve port 23a by a bracket 17a, an attachment 26 of the external piping b' is put on the former from outside, and the thermostat 17 is then fastened by a bolt (not shown).

[0047] Two valves 17b and 17c move back and forth with expansion and contraction of the wax (not shown) filled in the thermostat main body 17d and open and close the valve ports 23a and 23b. In other words, when the temperature of cooling water flowing from the cooling water inlet P is below the thermostat set temperature, the valve port 23a moves to the closing side while the valve port 23b moves to the opening side (to the state shown in Fig. 9) by the action of the valves 17b, and 17c; and when the cooling water temperature from the cooling water inlet N is higher than the set temperature, the valve port 23a moves to the opening side whereas the valve port 23b moves to the closing side. Cooling water flowing into the thermostat chamber 18 flows then into the cooling water gallery 19 as shown in Fig. 11, joins cooling water flowing from the cooling water inlets R and S (see Fig. 10), and flows out from the cooling water outlet K.

[0048] On the other hand, as shown in Figs. 7 and 8, the oil flows through the oil flow passage α'' from the oil inlet L opening in the first flange F, flows then to the ring-like groove 22 opening in the second flange G and thereafter flows towards the oil cooler (not shown). The oil fed back from the oil cooler side flows through the oil flow passage γ'' and flows out from the oil outlet M of the first flange F towards the engine main body (not shown).

[0049] As described above, a large quantity of cooling water flow through the thermostat housing 4 and moreover, the oil flows through the oil flow passages α'' and γ''. As shown in Fig. 11, these flow passages are integrally formed by aluminum alloy casting. Therefore, the effect of the cooling the oil by cooling water inside the thermostat housing 4 can be obtained, and eventually, the size of the oil cooler 6 can be reduced or the oil cooler 6 itself can be omitted.

[0050] The embodiment explained above is directed to the basic cooling water system and oil system, and it could be readily appreciated from the foregoing explanation that this system can be converted to the one in which other apparatuses using cooling water and the oil are further added.

[0051] To the thermostat housing 4 of the internal combustion engine according to Embodiment 2 of the invention, the oil filter 8 is directly fitted as shown in Fig. 13. This drawing shows the portions corresponding to those shown in Fig. 12.

[0052] In Fig. 13, a stud bolt 12 is screwed to the oil outlet 8b of the oil filter 8 in such a manner as to screwed into the oil flow passage γ'' of the thermostat housing 4. Same reference numerals are used to identify same

constituent members at this portion, and other portions not shown are the same as those of Embodiment 1 with the exception of the portions which are changed due to removal of the oil cooler 6, and their explanation will be omitted.

[0053] The thermostat housing for the internal combustion engine according to the present invention explained above achieves the following effects.

1) The first flange for fitting the thermostat housing to the engine main body and the second flange for fitting the oil cooler or the oil filter to the thermostat housing are formed on the thermostat housing. Therefore, the thermostat housing is allowed to serve as the bracket for the oil cooler or the oil filter to be fitted thereto and as the bracket for the oil pipings. In other words, the space for installation to the engine main body can be reduced, the size of the engine main body and the space for the external pipings of the engine main body can be reduced, and the number of necessary components can be decreased. Moreover, since the maintenance work of the thermostat, the oil filter, etc, can be conducted at the same place, the operation factor can be improved.

2) Because the fitting work of the apparatuses and the piping arrangement work can be carried out simultaneously, the means for forming the oil passages in the thermostat housing, particularly the abovementioned means for opening the oil passages in the first and second flange surfaces makes it possible to ensure more advantageously the installation space of the pipings, etc, to decrease the number of necessary components and to improve the efficiency of the assembly work.

3) Further, the means for forming the two oil passages in the thermostat housing and using one of them as the passage for introducing at least a part of the pressurized oil supplied from the oil pump to the oil cooler or to the oil filter and the other as the passage for guiding at least a part of the oil leaving the oil cooler or the oil filter to the engine main body can further decrease the number of necessary components and improve efficiency of the assembly work.

4) The means for forming at least two cooling water lead-in passages, allowing one of them to communicate with the cooling water jacket of the engine main body and the other with the water passage communicating with the cooling water jacket and the radiator, for forming the cooling water gallery communicating with the cooling water outlet side of the thermostat in the thermostat housing and for allowing this cooling water gallery to communicate with at least the cooling water pump suction side can reduce the number of necessary components of the cooling water pipings and improve the efficiency of the assembly work.

5) The means for disposing the oil passage formed in the thermostat housing adjacent to the cooling water lead-out passage can allow the thermostat housing to function as the oil cooler. When the thermostat housing is made of an aluminum alloy having a high heat transfer coefficient, it can be allowed to function as the oil cooler.

Claims

1. An internal combustion engine comprising a main body (3) with a thermostat housing (4) fitted thereto, said thermostat housing (4) including a thermostat (7) for cooling water for the engine and a first flange (F) with which the thermostat housing (4) is fitted to the engine main body (3), **characterized in that** said thermostat housing (4) has a second flange (G) for fitting an oil cooler (6) or an oil filter (8) for the engine, said second flange (G) being disposed at a position different from the position at which said first flange (F) is disposed; said first flange (F) and said second flange (G) having their respective surfaces extensions of which cross each other; and said thermostat housing (4) having at least one oil passage (α", γ") which opens to said first flange (F) and to said second flange (G) and communicates oil in the engine to said oil cooler(6) or oil filter (8).

2. An internal combustion engine according to claim 1, wherein said thermostat housing (4) is formed with two oil passages (α", γ"), of which one (α") is a passage for introducing at least a part of pressurized oil supplied from oil pump (7) to said oil cooler (6) or said oil filter (8), while the other (γ") is a passage for introducing at least a part of the oil flowing out of said oil cooler (6) or said oil filter (8) to said engine main body (3).

3. An internal combustion engine according to claim 1 or 2, wherein said thermostat housing (4) is provided with a cooling water outlet (K) communicating with a cooling water pump (2), said oil passage (α", γ") is arranged in the proximity of said cooling water outlet (K).

4. An internal combustion engine according to anyone of claims 1 to 3, wherein said oil cooler (6) and said oil filter (8) are integrally assembled, either said oil cooler (6) or said oil filter (8) being fitted to said thermostat housing (4); and the oil flowing through said oil cooler (6) and said oil filter (8) being allowed to flow into said engine main body (3) through said thermostat housing (4).

Patentansprüche

1. Brennkraftmaschine mit einem Hauptkörper (3) mit einem an diesem angebrachten Thermostatgehäuse (4), welches einen Thermostat (7) für Kühlwasser für den Motor und einen ersten Flansch (F) aufweist, bei welchem das Thermostatgehäuse (4) an dem Motorhauptkörper (3) angebracht ist, **dadurch gekennzeichnet, daß** das Thermostatgehäuse (4) einen zweiten Flansch (G) hat für die Anbringung eines Ölkühlers (6) oder eines Ölfilters (8) für den Motor, wobei der Flansch (G) an einer Position angeordnet ist, die sich von derjenigen Position unterscheidet, an welcher der erste Flansch (F) angeordnet ist; der erste Flansch (F) und der zweite Flansch (G) entsprechende Oberflächen haben, deren Verlängerungen einander kreuzen; und das Thermostatgehäuse (4) mindestens einen Öldurchgang (α", γ") hat, der sich zu dem ersten Flansch (F) und dem zweiten Flansch (G) öffnet und Öl im Motor mit dem Ölkühler (6) oder Ölfilter (8) verbindet.

2. Brennkraftmaschine nach Anspruch 1, wobei das Thermostatgehäuse mit zwei Öldurchgängen (α", γ") gebildet ist, deren einer (α") ein Durchgang ist für das Einführen mindestens eines Teils des unter Druck stehenden Öls, welches von der Ölpumpe (7) zu dem Ölkühler (6) oder dem Ölfilter (8) zugeführt wird, während der andere (y") ein Durchgang ist für das Einführen mindestens eines Teils desjenigen Öls, welches aus dem Ölkühler (6) oder dem Ölfilter (8) zu dem Motorhauptkörper (6) herausfließt.

3. Brennkraftmaschine nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** das Thermostatgehäuse (4) mit einem Kühlwasserauslaß (K) versehen ist, der mit einer Kühlwasserpumpe (2) in Verbindung steht und der Öldurchgang (α", γ") in der Nähe des Kühlwasserauslasses (K) angeordnet ist.

4. Brennkraftmaschine nach einem der Ansprüche 1 bis 3, wobei der Ölkühler (6) und der Ölfilter (8) einstückig angeordnet sind, entweder der Ölkühler (6) oder der Ölfilter (8) an dem Thermostatgehäuse (4) angebracht sind; und das Öl, welches durch den Ölkühler (6) und den Ölfilter (8) strömt, die Möglichkeit hat, in den Motorhauptkörper (3) durch das Thermostatgehäuse (4) zu fließen.

Revendications

1. Moteur à combustion interne comprenant un corps principal (3) avec un boîtier de thermostat (4) solidaire dudit corps principal, ledit boîtier de thermostat (4) comprenant un thermostat (7) pour l'eau de refroidissement du moteur et une première monture (F) au moyen de laquelle le boîtier de thermostat est fixé au corps principal (3) du moteur, **caractérisé en ce que** ledit boîtier de thermostat (4) comporte une seconde monture (G) pour fixer un refroidisseur d'huile (6) ou un filtre à huile (8) pour le moteur, ladite seconde monture (G) étant située à une position différente de la position à laquelle se trouve située la première monture (F) ; ladite première monture (F) et ladite seconde monture (G) ayant des faces dont les extensions se croisent, et ledit boîtier de thermostat (4) ayant au moins un passage d'huile (α" ,γ") qui s'ouvre sur ladite première monture (F) et sur ladite seconde monture (G).

2. Moteur à combustion interne selon la revendication 1, dans lequel ledit boîtier de thermostat (4) comporte deux passages d'huile (α" ,γ") dont un (α") est un passage pour introduire au moins une partie de l'huile pressurisée fournie par une pompe à huile (7) audit refroidisseur d'huile (6) ou audit filtre à huile (8), tandis que l'autre (γ") est un passage pour introduire au moins une partie de l'huile s'écoulant dudit refroidisseur d'huile (6) ou dudit filtre à huile (8) vers ledit corps principal (3) du moteur.

3. Moteur à combustion interne selon la revendication 1 ou 2, dans lequel ledit boîtier de thermostat (4) comporte une sortie d'eau de refroidissement (K) communiquant avec une pompe à eau de refroidissement (2), ledit passage d'huile (α" ,γ") étant disposé à proximité de ladite sortie d'eau de refroidissement (K).

4. Moteur à combustion interne selon une quelconque des revendications 1 à 3, dans lequel ledit refroidisseur d'huile (6) ou ledit filtre à huile (8) sont assemblés intégralement, soit ledit refroidisseur d'huile (6) soit ledit filtre à huile (8) étant solidaire dudit boîtier de thermostat (4), et l'huile s'écoulant à travers ledit refroidisseur d'huile (6) et ledit filtre à huile (8) pouvant s'écouler dans ledit corps principal (3) du moteur à travers ledit boîtier de thermostat (4).

Fig. 1

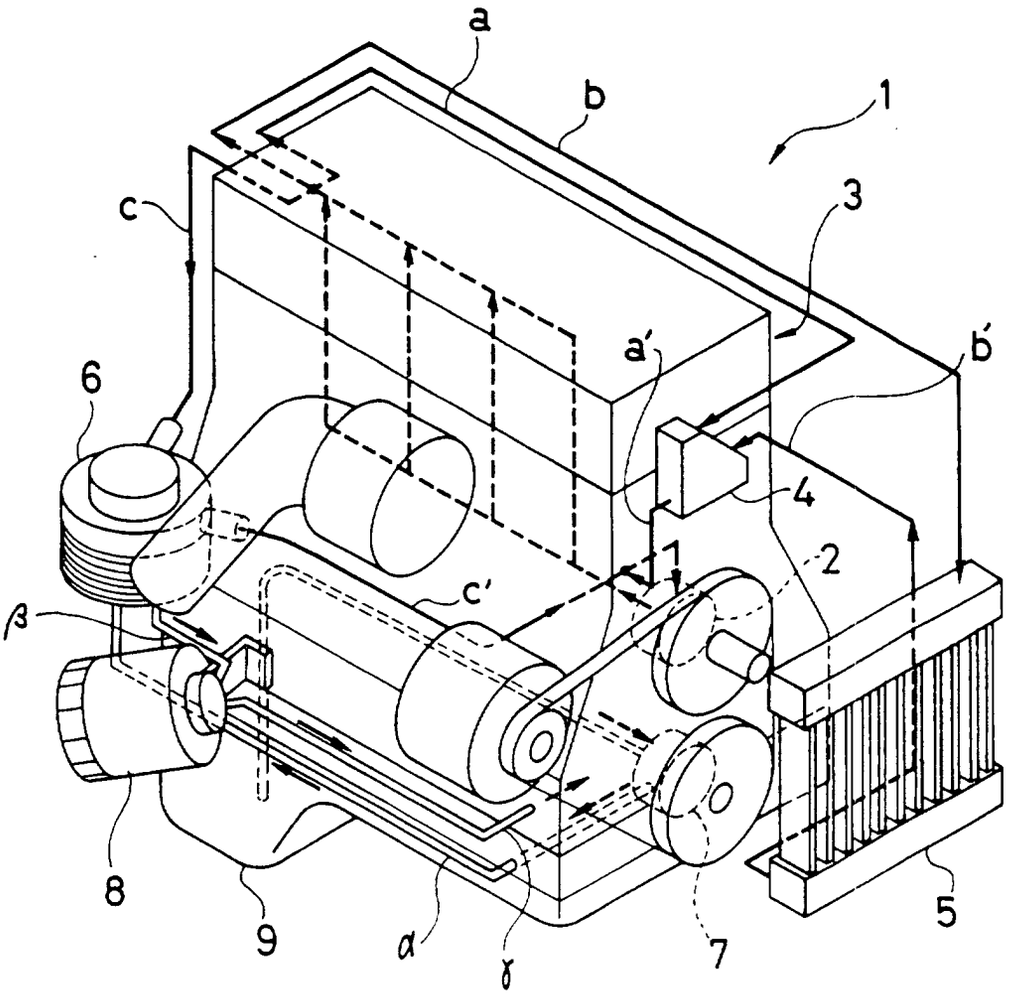

Fig. 2

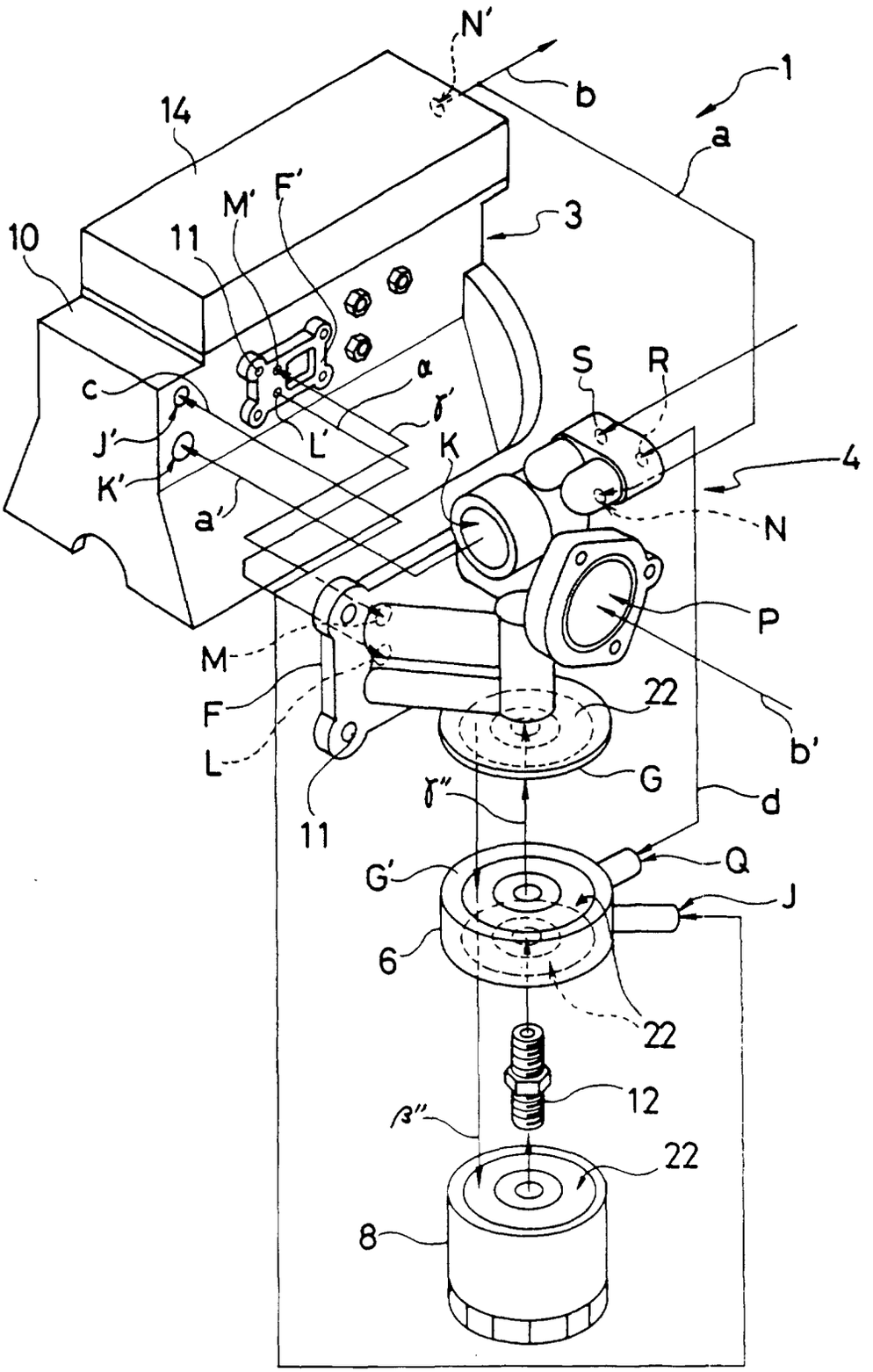

Fig. 3

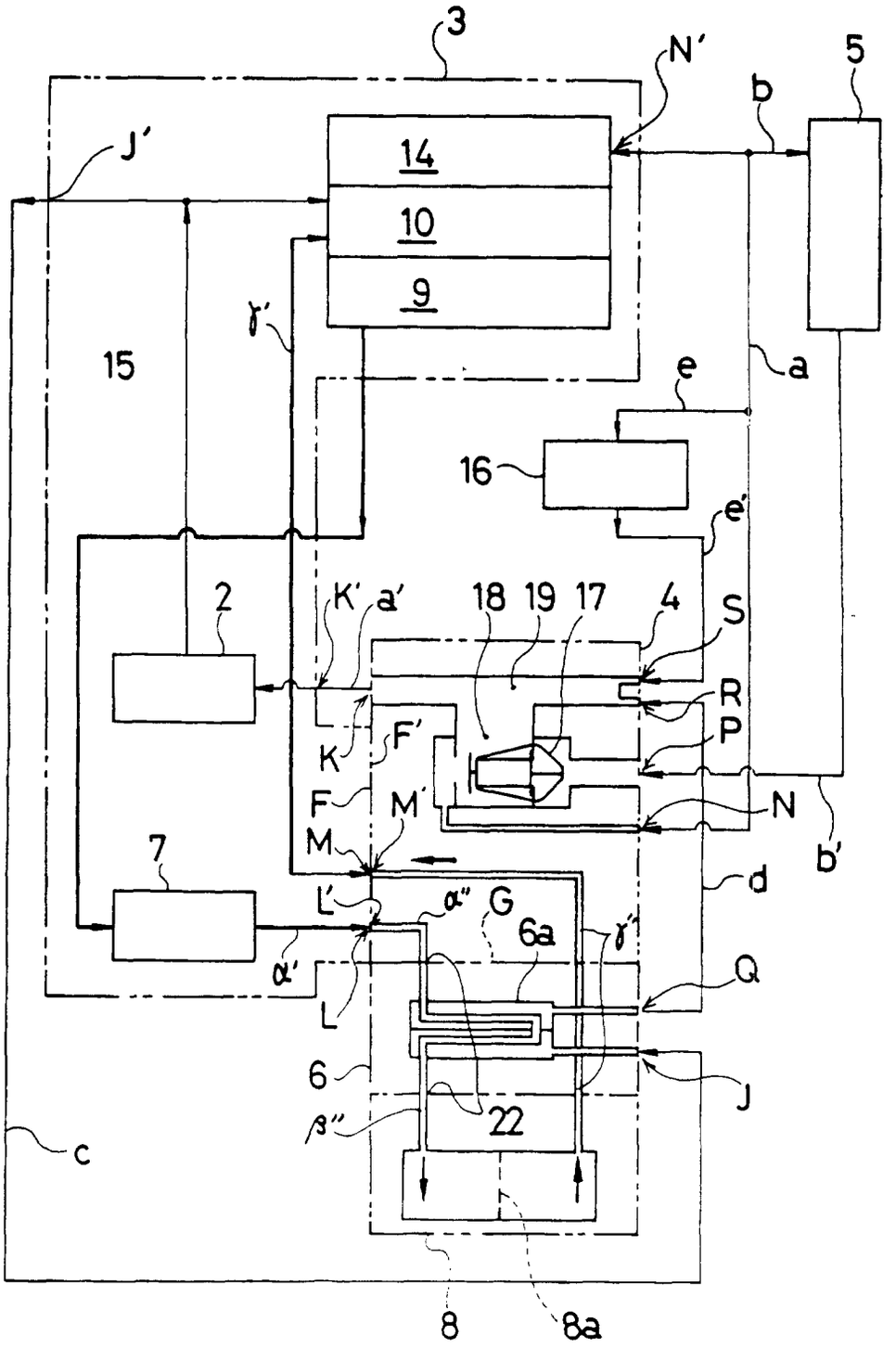
3
N'
5
b
J'
14
10
9
γ'
15
e
a
16
e'
2
K'
a'
18
19
17
4
S
R
P
K
F'
F
M'
N
M
7
b'
d
L'
α"
G
6a
γ'
α'
Q
L
6
J
β"
22
c
8
8a

Fig. 4

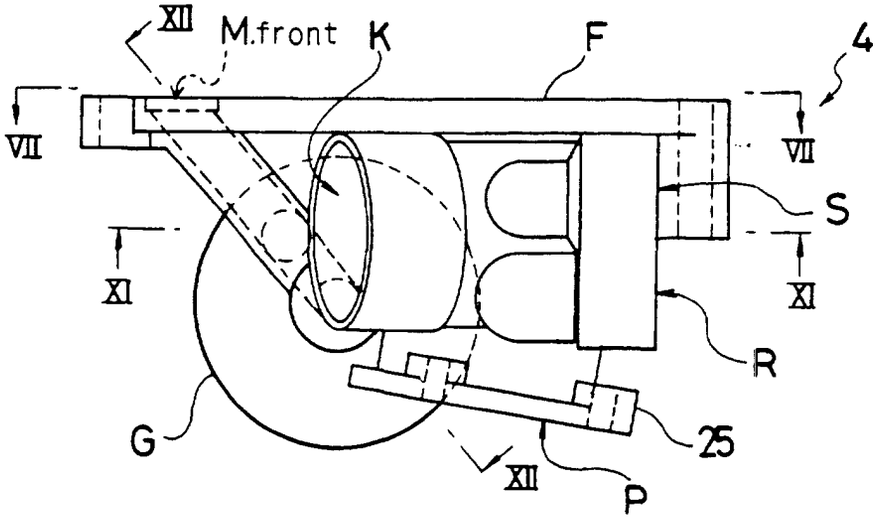
XII
M.front
K
F
4
VII
VII
S
XI
XI
R
G
25
XII
P

Fig. 5

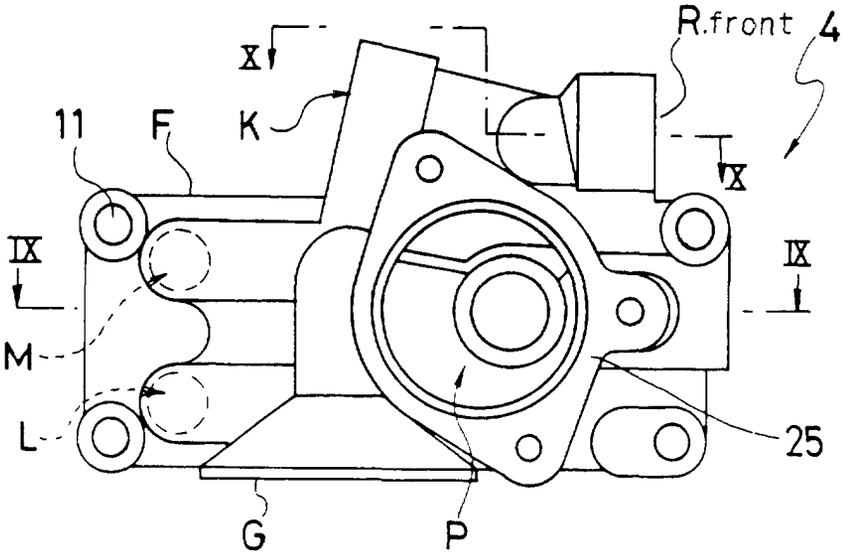
R.front
4
X
11
F
K
X
IX
IX
M
L
25
G
P

Fig. 6

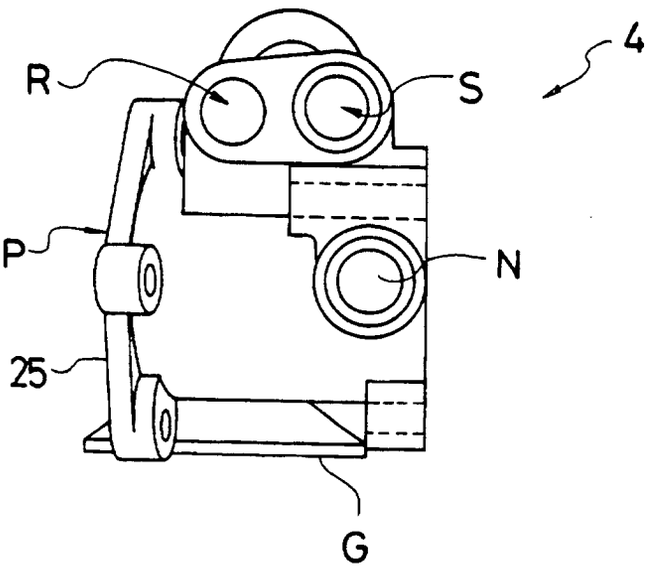

Fig. 7

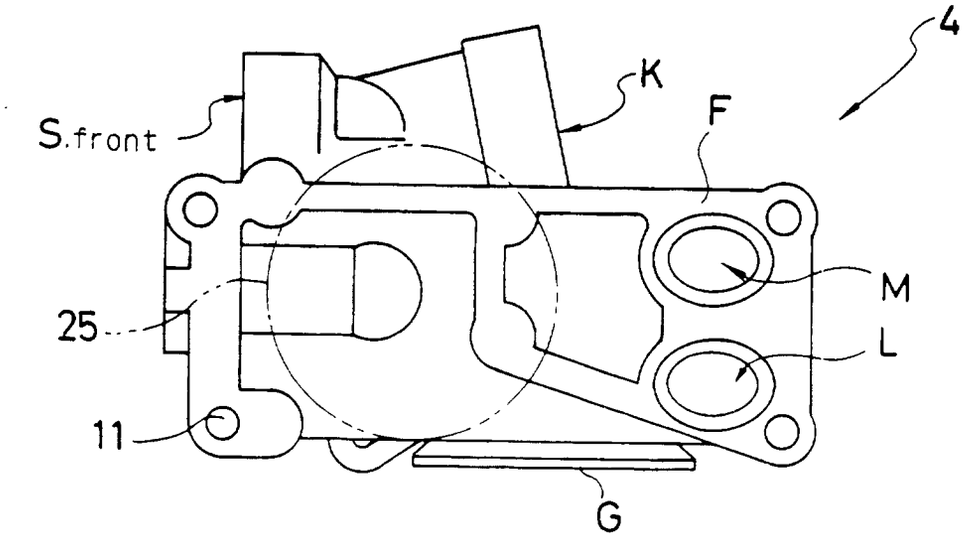

Fig. 8

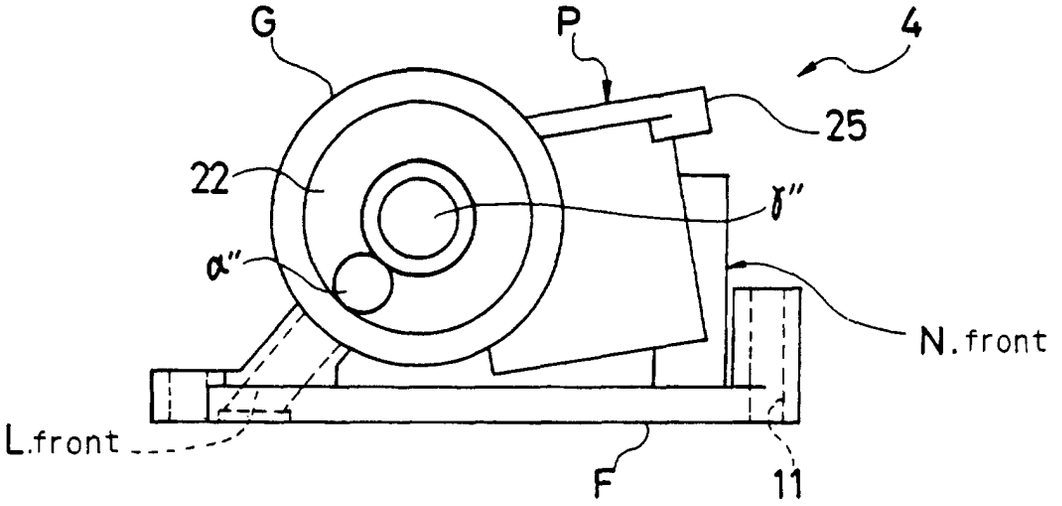
G
P
4
25
22
γ"
α"
N.front
L.front
F
11

Fig. 9

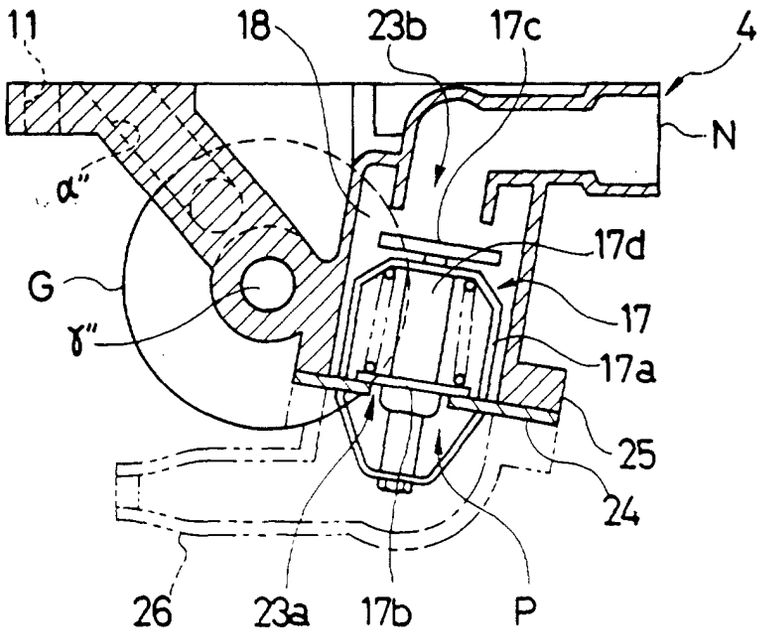
11
18
23b
17c
4
N
α"
17d
G
17
γ"
17a
25
24
26
23a
17b
P

Fig. 10

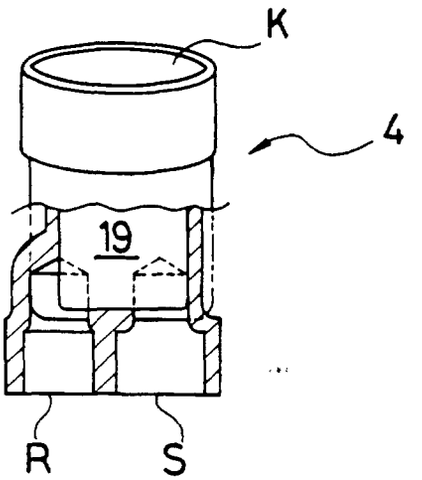

Fig. 11

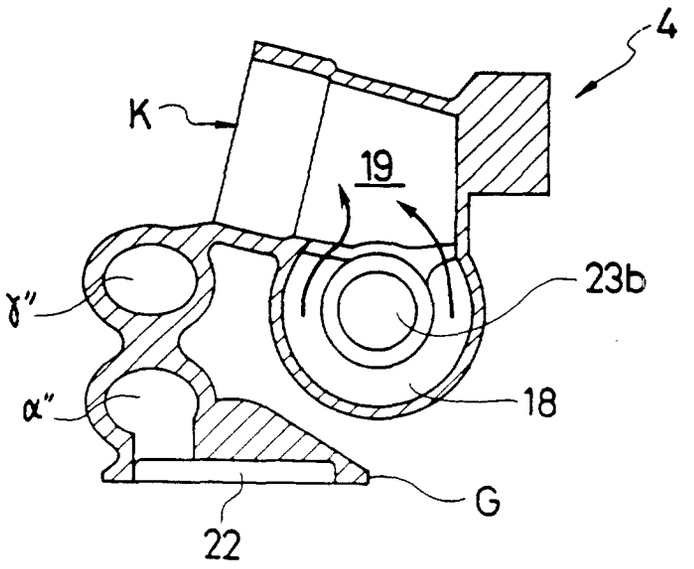

Fig. 12

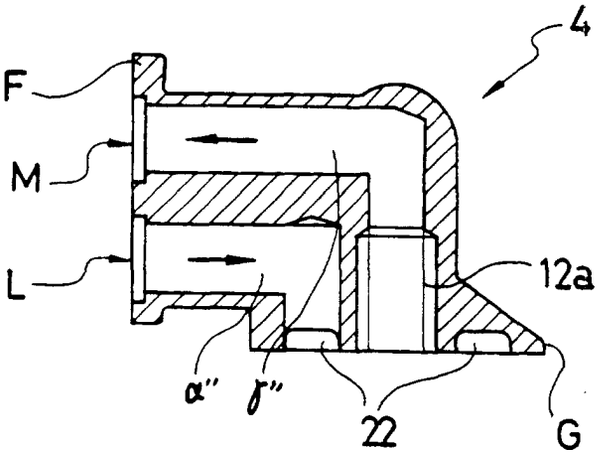

Fig. 13