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Invention S.r.l.

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(54) **Plate and closing cap for thermal radiators manifolds provided with integrated bleed valve**

(57) A plate intended to close heads of thermal radiators manifolds is provided with a recess (4), threaded on one of its sides, having a through hole (6) with reduced diameter on the bottom of the recess (4). The linking section between the recess (4) and the through hole (6) is so shaped to provide a valve seat (11), which is engaged by a threaded dowel (8) introduced in the recess (4). When screwing the threaded dowel (8), sealing between recess (4) and through hole (6) is provided. A closing cap

for radiators manifolds or for radiators is similarly provided with a recess (21), made communicating with the opposite side of the cap (15), by means of a through hole (22) which is threaded and provided with longitudinal grooves (23). The dowel (25) is divided in two parts, one having reduced diameter (27) and being threaded to engage the through hole (22) until a frustum of cone section (29) of the dowel abuts against a valve seat (30) provided on the bottom of the recess (21).

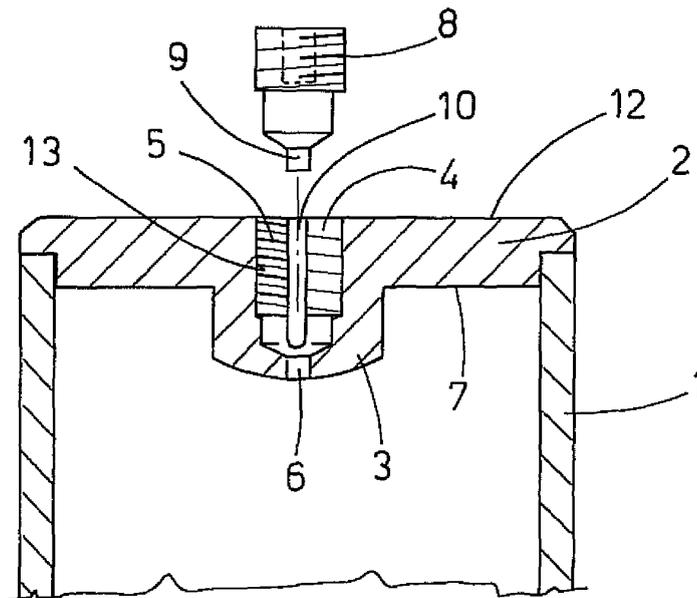


FIG. 1

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Description

DESCRIPTION OF THE INVENTION

[0001] The present invention relates to the construction of thermal radiators, in particular intended to use in flats or housing structures of hotel kind or the like.

[0002] Particularly, the present invention relates to a closing plate for heads of thermal radiators manifolds, shaped in order to include a bleed element for air collected inside the water circulation system.

[0003] It is known that some kinds of thermal radiators used in heating systems are constituted by two tubular manifolds, radiant tubular elements being arranged between them.

[0004] The water, heated and led by the circulation system, flows into one of the manifolds and through the tubular radiant elements and is then collected in the opposite manifold in order to be re-admitted into the circulation system.

[0005] According to known techniques, the heads of the manifolds are closed by means of plates, shaped according to the section of the pipe used to provide the manifolds.

[0006] Embodiment examples of the plates can be found in the Italian patent n° 1290646, which describes a method for producing such plates, or in the Italian patent application for industrial invention BO2006A 000764 relating to the production of a plate provided with means which facilitate its welding to the manifold.

[0007] The plates, as yet described, are shaped according to the section of the manifold, so they can be semi-oval, oval, quadrangular, or however they can have any shape.

[0008] For convenience, in the following description and in the appended figures as well, reference will be made only to the semi-oval shape, being however intended that the invention can be also applied to differently shaped plates.

[0009] The plates are provided with a projection which is introduced in the head of the manifold, for its positioning. The plate is then welded to the manifold along the edge by means of several known techniques, which are not described as not relevant to the present invention.

[0010] The circulation system pipes of the heated water are typically fixed to two such plates, which, preferably, are not part of the same manifold.

[0011] Moreover, to at least one of the fixed plates is then applied a bleed valve for the air, which inevitably collects over the time inside the radiator and that might prevent or at least obstruct the correct circulation of the heating liquid.

[0012] It is to be underlined that the currently on the market available valves are made up by a cylindrical or polygonal body, with a threaded end, so that they can be screwed in the plate provided with a suitably dimensioned threaded hole. The valve body is also provided with a cock which allows the opening of a pipe inside the same,

consequently releasing the air collected in the radiator. Obviously this embodiment implies high costs.

[0013] In order to provide the connection of the pipes of the hydraulic system and the application of the valve, some plates are provided with a little extended threaded tube, inserted on the plate or obtained in other ways, at a through hole.

[0014] On the contrary, other plates have solid surface and do not have particular functions other than that of closing the head of the manifold. These solid surface plates are often provided with a protuberance, provided by drawing during the procedure for their production, which protuberance leaves a blind hole on the outer side.

[0015] This hole is threaded and used to introduce a bearing screw of the plate during finishing operations, such as for example paint coating.

[0016] A type of on the market available closing caps is provided with the bleed valve, realized by means of a hole made in the same and then partly threaded.

[0017] In the greater diameter threaded portion is introduced a dowel which closes the section of the reduced diameter hole by means of the frustum of cone portion.

[0018] A radial hole connects the bottom of the threaded hole with the outside. Therefore, unscrewing the dowel it is possible to let air out through the radial hole, as to provide bleeding.

[0019] The outer portion of the cap undergoes machining (turning, milling) such that one can work on the same by means of suitable tools and can fix the cap to the radiator.

[0020] It is an object of the present invention to provide a plate, yet comprising the air bleed valve, in order to avoid the need to subsequently provide the valve and its application, consequently implying obvious advantages with regards to time and to materials setup, during the installation of the system in general.

[0021] Another object of the invention is to provide a plate comprising the bleed valve integrated therein, using, when possible, the configuration of the presently used plate.

[0022] Yet another object of the invention is to further develop the known, currently on the market available closing caps, in order to give them structural and functional properties, so that their convenience both from the cost point of view and that of the aesthetical result can be highlighted.

[0023] The above-mentioned objects are accomplished by means of a closing plate for heads of thermal radiators manifolds, characterized in that it comprises a threaded recess made on one of its sides, having a through hole with reduced diameter with respect to the diameter of the recess and made on the bottom of said recess, wherein the linking section between said recess and said through hole is so shaped to provide a valve seat, which is engaged with a threaded dowel introduced in the recess in order to provide sealing between said recess and said through hole, when the threaded dowel is screwed, and their communication when the threaded

dowel is loosened.

[0024] The features of the invention, not apparent from the preceding description, emerge from the following description with reference to the appended figures, in which:

- figure 1 shows a sectional schematic view of an end of a manifold closed by means of a plate provided according to the present invention;
- figure 2 shows a front view of the same plate;
- figure 3 and figure 4 show both the plate of figure 1, in two characteristic states respectively;
- figures 5 and 6 show a variant embodiment of the plate;
- figure 7 shows an exploded view of the application of the invention on a closing cap of manifolds or radiators;
- figure 8 shows a top view of the application of figure 7.

[0025] Referring to said figures, the reference number 1 indicates the end portion of a tubular manifold of a thermal radiator (non shown in its entirety). The head of the manifold 1 is closed by means of a plate 2, which is introduced with a projection in the manifold and welded to it by means of known techniques, in order to provide sealing.

[0026] The plate 2 is semi-oval shaped, any shape being however possible.

[0027] The plate 2 has a protuberance 3 facing inside the manifold 1, with a recess 4, which is opened towards outside. The protuberance can be provided in several ways, that is it can be obtained by means of drawing on the plate or inserted by applying a little holed cylinder on the surface 7 of the plate 2 facing inside the manifold. In this case, the plate is previously holed or is obtained by drawing yet provided with the hole.

[0028] The recess 4 is provided with a thread 5. The walls of the recess 4 are crossed by some longitudinal grooves 10, for example three, which extend longitudinally from the edge to the bottom of the recess, intercepting at least the thread 5 and possibly the wall of the recess as well.

[0029] In figure 1 it is visible only one groove 10, while in figure 2 is visible every groove, which in the shown embodiment is realized by way of example.

[0030] The bottom of the recess 4 is provided with a sized hole 6, which crosses the protuberance 3.

[0031] Inside the threaded recess 4 is introduced a dowel 8, threaded as well, provided at its tip with an appendix 9 having a diameter corresponding to the one of the sized hole 6.

[0032] During the normal radiator functioning, the dowel 8 remains screwed so that the appendix 9 is introduced in the sized hole 6 and the dowel tip abuts against the

bottom of the recess 4, as shown in figure 3.

[0033] Optionally, an O-ring can be disposed between the frustum of cone portion of the dowel and the valve seat provided in the bottom of the recess 4, consequently enhancing the sealing properties.

[0034] In this way, sealing is provided and the liquid flowing inside the manifold 1 does not leak out.

[0035] When air collects inside the manifold and bleeding is required, it suffices to unscrew the dowel, by means of a suitable tool, for example a typical screwdriver, so that the grooves 10 communicate with the sized hole 6 and as a consequence with the inside of the manifold 1.

[0036] This state is visible in figure 4.

[0037] Then the air leaks out and the dowel can be tightened, providing sealing again, as shown in figure 3.

[0038] The bleed valve is thus provided.

[0039] As a result, the plate object of the invention, is produced with the bleed valve yet integrated therein, whereby the application of a traditional type external valve, after assembling the radiator, is no more necessary.

[0040] Other, more general advantages will be evident especially to those experts in the art. On the one hand, the installation times are reduced since it is not necessary a further assembly step of the bleed valve.

[0041] On the other hand, the valve thus produced is inexpensive as it requires only screwing a dowel, without external elements and therefore it is better also from an aesthetical point of view.

[0042] Eliminating the outer valve implies reducing costs as it eliminates both an element and its mounting.

[0043] As yet stated, the protuberance 3 on the plate can be produced by different methods, using known techniques, such for example drawing or by applying a cylindrically shaped segment, at a hole made in the plate.

[0044] In the example shown in figures 5 and 6, the cylindrical segment 31, possibly yet provided with the recess 4 with the thread 5, made on the inner wall 13, with the sized hole 6 and the grooves 10, is introduced with its suitably shaped portion in a seat 33, provided in the plate 34, to which the cylindrical segment 31 has to be fixed.

[0045] A copper ring 32 is interposed to provide sealing. The edge of the plate 34 surrounding the cylindrical segment 31 is then riveted (calking) in order to provide fixing (figure 6).

[0046] Obviously, the cylindrical segment can be applied also by other fixing means, for example by welding, whereby the copper ring 32 is no more necessary, or by interference.

[0047] Moreover, the threaded blind recess used to perform finishing on the plate, after providing a through hole on the bottom of the same recess, can be advantageously used to achieve the aim of the invention.

[0048] According to a variant embodiment of the invention, shown in figures 7 and 8, the valve realized with the threaded dowel is also provided on closing caps of manifolds or radiators.

[0049] The concerned cap 15 is realized by means of a pressing procedure, starting from a metal sheet.

[0050] The reduced diameter portion 17 is provided with an outer thread 18, which makes it suitable to be screwed in the threaded hole 19 of a traditional plate 16, for closing a manifold. An O-ring 24 can be arranged around the reduced diameter threaded portion 17, to guarantee sealing when the cap is tightened.

[0051] The reduced diameter portion 17 of the cap 15 encloses a recess 20, realized during pressing of the cap. The widest portion of the cap 15, intended to remain outside the plate 16, or in general the radiator, is provided with a recess 21 as well, which is hexagonally sectioned shaped.

[0052] By means of a through hole 22 provided with some longitudinal grooves 23, similar to the longitudinal grooves 10 of the above-described example, the bottom of the hexagonal recess 21 is made communicating with the recess 20 delimited by the reduced diameter portion 17. Also in this case, three along the wall of the hole equidistant grooves can be provided by way of example.

[0053] The through hole 22 is also provided with a thread.

[0054] Also in this case, a dowel 25 is introduced in the recess 21. Here, however, the dowel is divided in two portions, that is one greater diameter portion 26 and one reduced diameter portion 27, which are connected together by means of a frustum of cone section 29.

[0055] Only the reduced diameter portion 27 of the dowel 25 is threaded. It is introduced in the through hole 22 and screwed until the frustum of cone section 29 of the dowel abuts against the valve seat 30, provided in the bottom of the recess 21, at the through hole 22.

[0056] An O-ring 28 can be possibly arranged to provide a safe sealing.

[0057] When the dowel is introduced in the recess 21, its threaded reduced diameter portion 27 is screwed in the through hole 22, which is threaded as well. The greater diameter portion 26 of the dowel 25 is introduced in the recess 21 so that the head of the dowel aligns with the head of the cap 15.

[0058] Loosening the dowel 25 permits the air to be bled to leak out through the grooves 23.

[0059] The application of the present invention to the cap 15 is very and clearly advantageous.

[0060] First of all, if the dowel 25 is configured as described, with two portions having different diameter, only the innermost one being threaded, it is possible to use the recess 21 by shaping it according to a hexagonal profile.

[0061] Therefore, by introducing a suitable key, it is possible to tighten the cap 15 even if its outer shape is perfectly circular. The coating of the cap 15, paints or other, is not thus damaged in any way.

[0062] Another advantage of the described configuration is to make the radial hole useless, since the air bleeding is allowed by the grooves 23 of the threaded through hole 22. The air flows from the grooves in the recess 21

and from this to the outside.

[0063] Therefore, the exterior machining of the cap, required to be able to tighten the known caps by means of a tool during assembly, are eliminated. The polygonal shape of the seat 21 is provided during pressing of the cap, without requiring further working steps.

[0064] The caps thus obtained result better than the known caps from an aesthetical point of view. There are no projecting portions and it is easier to apply a coating, consequently attaining a more pleasant result.

[0065] It is intended that all matter contained in the above description shall be interpreted as illustrative and not limiting; various structural variants are therefore intended to fall within the protection scope as defined by the following claims.

Claims

1. Closing plate for heads of thermal radiators manifolds, **characterized in that** it comprises a threaded recess (4) made on one of its sides, having a through hole (6) with reduced diameter with respect to the diameter of the recess (4) and made on the bottom of said recess (4), wherein the linking section between said recess (4) and said through hole (6) is so shaped to provide a valve seat (11), which is engaged with a threaded dowel (8) introduced in the recess (4) in order to provide sealing between said recess (4) and said through hole (6), when the threaded dowel (8) is screwed, and their communication when the threaded dowel (8) is loosened.
2. Plate according to claim 1, **characterized in that** said recess (4) is realized in a protuberance (3) associated to one of the sides of the plate (2).
3. Plate according to claim 1 or 2, **characterized in that** along the walls of the initial portion of the hole is provided at least a groove (10), which crosses at least the thread (5) of the hole.
4. Plate according to claim 3, **characterized in that** the groove or grooves crosses/cross the inner wall of the hole as well.
5. Plate according to claim 3 or 4, **characterized in that** three grooves are provided, which extend longitudinally in the hole.
6. Plate according to any one of the preceding claims, **characterized in that** said recess is provided in a protuberance provided on a surface of the plate (2).
7. Plate according to claim 6, **characterized in that** said protuberance is realized by drawing.
8. Plate according to claim 6, **characterized in that**

said protuberance is realized by inserting a cylindrical segment (31) provided with a recess (4), the segment being applied to the plate by welding, calking or interference.

- 5
9. Plate according to any one of claims 6 to 8, **characterized in that** the protuberance (3) is realized on a surface of the plate (2) intended to remain facing inside the manifold (1).
- 10
10. Cap for closing plates for radiators manifolds or for radiators, with a recess (21) on its portion intended to remain outside the plate (16) or the radiator, which recess (21) is made communicating with the opposite side of the cap (15), or with the inner part of the radiator, by means of a through hole (22) provided with a thread and longitudinal grooves (23), with a dowel (25) divided in two portions, that is one greater diameter portion (26) and one reduced diameter portion (27), which are connected together by means of a frustum of cone section (29), only the reduced diameter portion (27) being threaded, said dowel (25) being introduced by screwing with said reduced diameter portion (27) in the through hole (22), until the frustum of cone section (29) of the dowel abuts against the valve seat (30), provided on the bottom of the recess (21), at the through hole (22).
- 15
- 20
- 25
- 30
11. Cap according to claim 10, **characterized in that** an O-ring is interposed between said frustum of cone section (29) of the dowel and said valve seat (30).
- 35
12. Cap according to claim 10 or 11, **characterized in that** the recess (21) provided on the portion of the cap (15) intended to remain outside the plate (16) or the radiator is hexagonally sectioned shaped.
- 40
13. Cap according to any one of claims 10 to 12, **characterized in that** in the portion (17) of the cap (15) intended to be fixed to said plate (16) or said radiator is provided a relative recess (20), in which said through hole (22) opens.
- 45
14. Cap according to any one of claims 10 to 13, **characterized in that** along the wall of the through hole (22) are provided three equidistant grooves (23).
- 50
15. Cap according to any one of claims 10 to 14, **characterized in that** it is realized by means of a pressing procedure, starting from a sheet and **in that** the reduced diameter portion (17) of the cap (15) intended to be fixed to the plate (16) or the radiator delimits a recess (20), provided during the pressing procedure of the cap.
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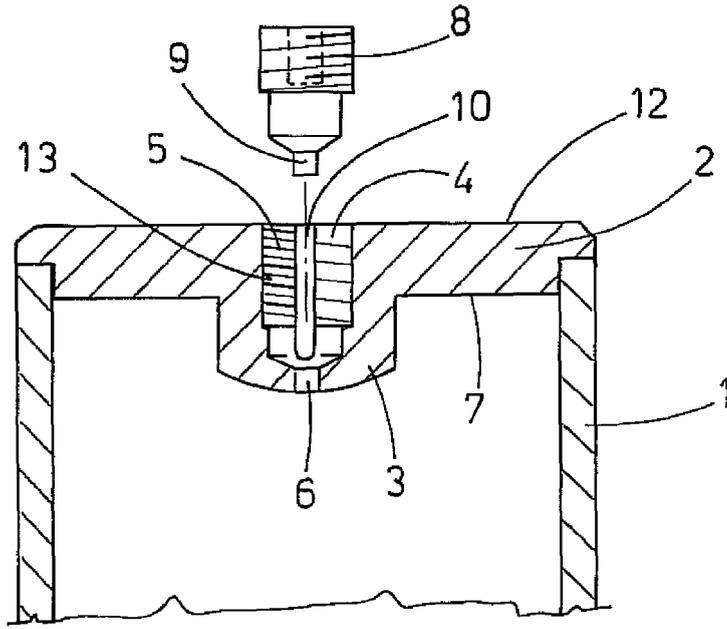


FIG. 1

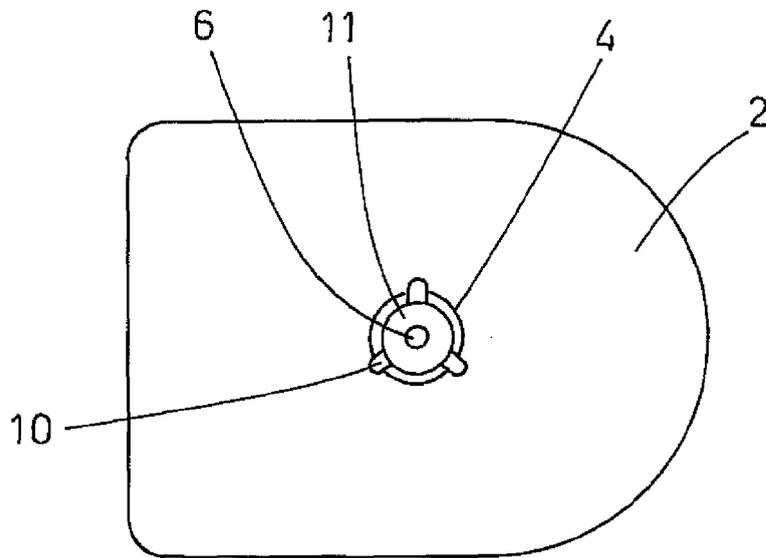


FIG. 2

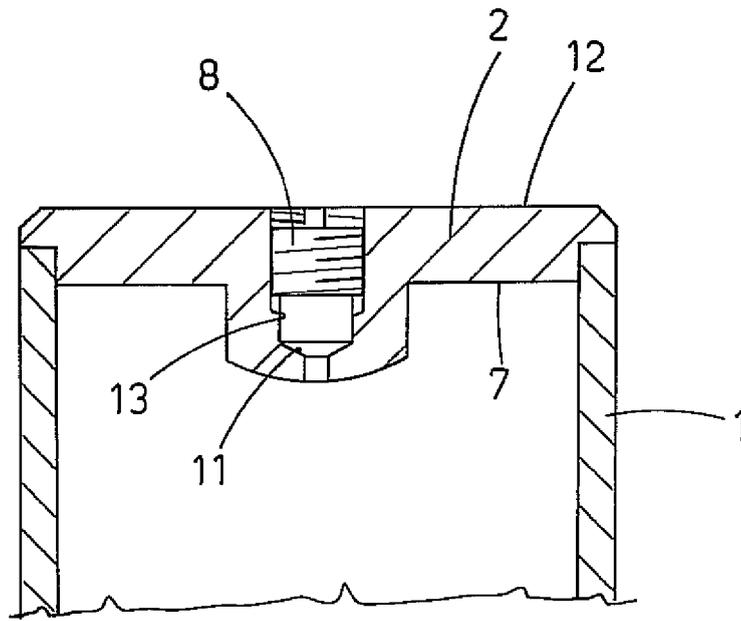


FIG. 3

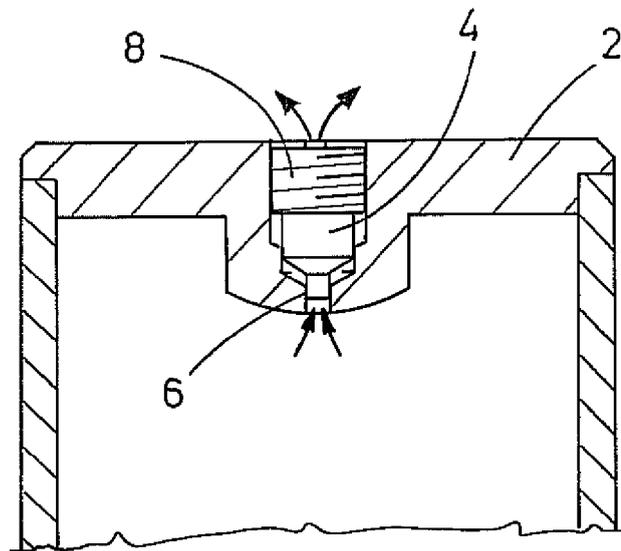
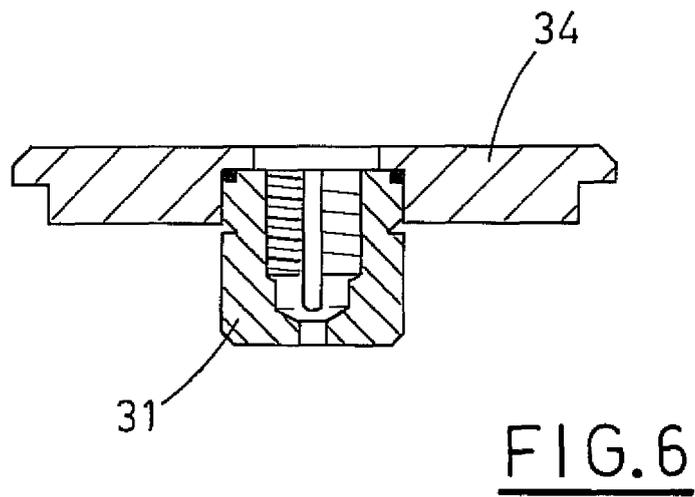
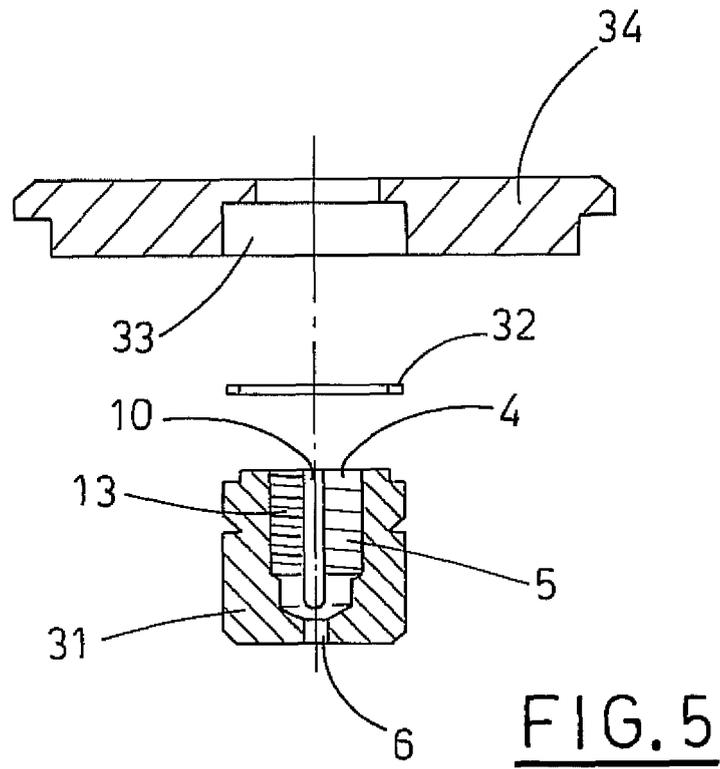
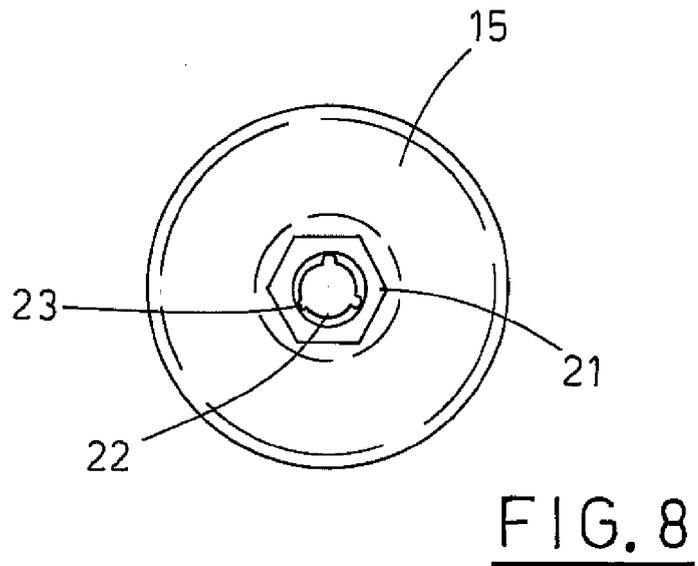
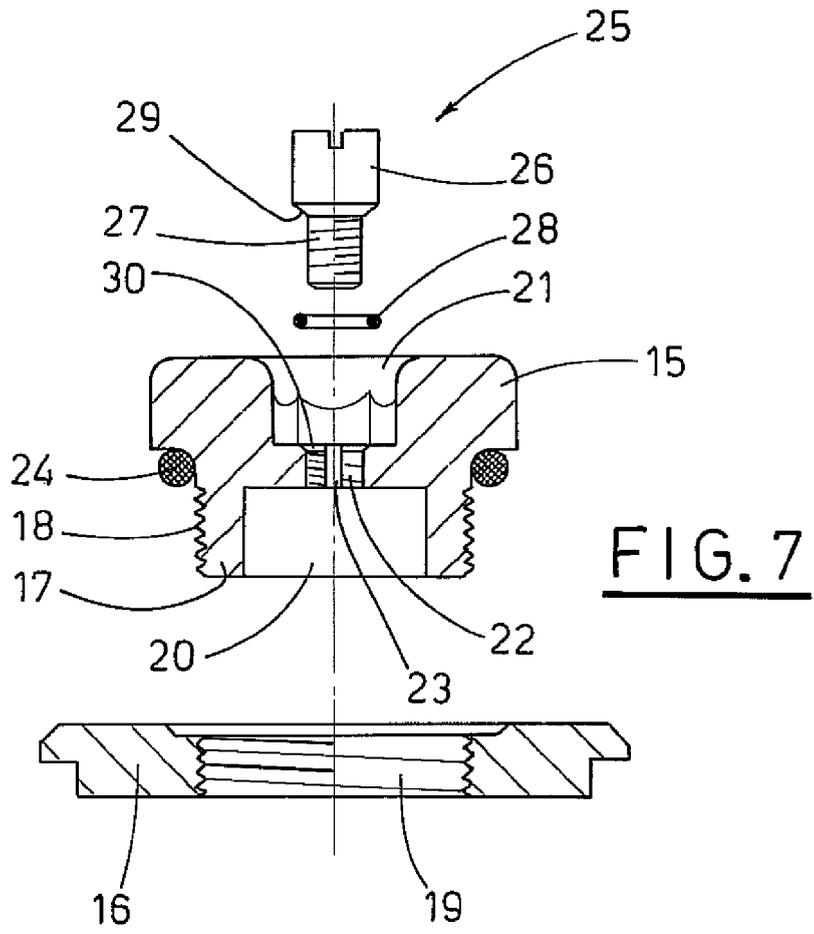


FIG. 4





REFERENCES CITED IN THE DESCRIPTION

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