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(54) HEAD FOR THERMAL RADIATORS AND METHOD FOR MAKING THE HEAD

(57) Described is a head (3) for thermal radiators, formed by a hollow body (11) which has an end cap (12) and a side wall (13), which extends from the end cap (12) and finishes with at least two tubular extensions (14) facing the end cap (12); wherein the side wall (13) is equipped with two circular openings (15) axially aligned with each other along a direction at right angles to the

direction of extension of the tubular extensions (14); and wherein the circular openings (15) are made and lie on respective flat lateral faces (16), parallel to and facing each other, of the hollow body (11), and the peripheral edges (17) of the circular openings (15) are each shaped like a single thread (18) made in the thickness of the respective flat lateral face (16).

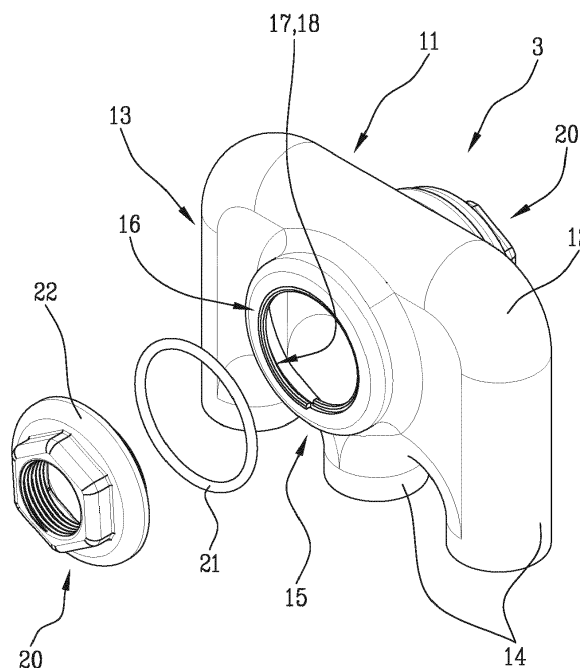


Fig.6

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Description

[0001] This invention relates to a head for thermal radiators and to a method for making the head.

[0002] In particular, the invention relates to a head to be used for supporting and connecting together several tubular radiant elements in the context of making a module of a thermal radiator designed for heating rooms.

[0003] In the field of heating systems, in particular for household use, the use of radiators is known which consist of a plurality of modules side by side and each comprising two heads (for example, a lower one and an upper one, or one on the right and one on the left), which act as manifolds for joining and supporting tubular elements, generally side by side in pairs or in sets of three (but also in sets of four or five elements), in the direction transversal to that in which the heads of the adjacent modules are placed alongside each other.

[0004] The tubular elements are connected to the heads in a sealed fashion and it is generally achieved by gluing or welding.

[0005] The connection between the heads of the adjacent modules, also in a sealed fashion, is, on the other hand, generally achieved by means of threaded tubular joints equipped with a sealing gasket.

[0006] The end modules of the thermal radiator obtained in this way are connected, by valves, to heating fluid inlet/outlet conduits.

[0007] One embodiment of the heads described above is known from patent document EP854347.

[0008] According to this embodiment, each head is equipped with two inner threads facing each other, at the relative lateral ends positioned along the line of composition of the modules.

[0009] These threads are made by machining after forming the heads which, usually, is achieved by moulding.

[0010] A threaded tubular joint is used for the connection between two adjacent heads. Starting from the centre line of the joint, the longitudinal ends of the joint are provided on the outside with respective threading, in opposite directions to each other, and an annular seal (O-ring) is positioned between the two threads at the centre line.

[0011] The radiator is made by screwing the corresponding threaded joints to the two heads of a first module. Subsequently, the modules are connected to each other by gradually interposing the threaded joints until the desired dimensions of the radiator are reached. Lastly, two of the four head threads left free at the lateral ends of the radiator are closed by closing caps, whilst the other two are connected to the heating system by means of respective valves.

[0012] The production of the inner threads of the heads is quite expensive and requires relatively complex machining and machinery.

[0013] To overcome this drawback, patent document EP1395785 proposes three different solutions.

[0014] In a first solution two threaded openings are welded to the outside of each head, at two lateral openings of the head opposite each other along the composition line of the modules.

5 **[0015]** However, this solution has an evident critical aspect with regard to the appearance since the welds, since they are outside, are on view.

[0016] A second solution comprises welding two threaded opening inside the head, again at the lateral openings of the head opposite each other along the composition line of the modules.

10 **[0017]** In this case, however, the welds, since they must be made inside the head, are difficult to make.

[0018] According to a third solution, on the other hand, the adjacent heads are welded directly to each other, at their lateral openings aligned and coupled along the composition line of the modules.

15 **[0019]** In this case, for appearance and sealing reasons, the welds are made inside the heads during the composition of the modules. For this reason, this solution is not only difficult to implement but also completely unsuitable for sizing the radiator at the installation site.

20 **[0020]** The aim of this invention is to provide a head for thermal radiators and a relative method for making radiators which overcome the above-mentioned drawbacks.

25 **[0021]** Said aim is fully achieved by a head for thermal radiators and a relative method for making thermal radiators as characterised in the appended claims.

30 **[0022]** The main features of the invention will become more apparent from the following description of preferred, non-limiting embodiments of it, illustrated by way of example in the accompanying drawings, in which:

- 35 - Figure 1 illustrates a thermal radiator made according to the invention;
- Figure 2 is a cross-section of a head of the radiator of Figure 1;
- Figures 3 and 4 are cross-sections of an alternative embodiment of the head of Figure 2;
- 40 - Figure 5 is a perspective view of the head of Figures 3 and 4;
- Figure 6 is an exploded perspective view of the head of Figures 3 and 4;
- 45 - Figures 7 and 8 are two opposite exploded views of a closing element provided in association with a respective head in the thermal radiator of Figure 1;
- Figure 9 is a perspective view of the closing element of Figures 7 and 8 in an assembled configuration;
- 50 - Figure 10 is a cross-section of the closing element of Figure 9; and
- Figure 11 is an exploded cross-section of the closing element of Figure 9.

55 **[0023]** With reference to Figure 1, the reference numeral 1 denotes in its entirety a thermal radiator, in particular of the type designed for heating rooms.

[0024] The radiator 1 comprises a plurality of modules

2, positioned side by side and connected in a sealed fashion, with a number such as to impart to the radiator 1 a desired width L.

[0025] Each module 2 has two heads 3 (in the example, an upper head and a lower head), which act as manifolds for joining and supporting two or more tubular elements 4 (three in the example), placed side by side in the direction transversal to that according to which the heads 3 of the adjacent modules 2 are placed side by side.

[0026] The tubular elements 4 are connected to the heads 3 in a sealed fashion and it is achieved by gluing or welding.

[0027] According to both the embodiments of the heads 3 illustrated in detail in Figure 2 and, respectively, in Figures 3 to 6, the connection between the heads 3 of the adjacent modules 2, also in a sealed fashion, is, on the other hand, made by screwing tubular joints 5, threaded externally and each equipped with a sealing gasket 6, in particular in the form of an O-ring, positioned in an axially median position.

[0028] The end modules 2 of the radiator 1 are connected, by respective valves 7 and 8, one to a supply conduit 9 and one to a return conduit 10 of the heating fluid.

[0029] Again with reference to both the embodiments of the heads 3 illustrated in Figure 2 and, respectively, in Figures 3 to 6, each head 3 comprises a hollow body 11 having an end cap 12 and a side wall 13, which extends from the end cap 12 and ends with at least two tubular extensions 14 (three in the example, visible only in Figures 4, 5 and 6) opposite the end cap 12.

[0030] Each tubular extension 14 is coupled in a sealed fashion to a longitudinal end of a respective tubular element 4.

[0031] The side wall 13 of the hollow body 11 is equipped with two circular openings 15, which are axially aligned with each other along a direction at right angles to the direction of extension of the tubular extensions 14, and opposite each other along the composition line of the modules 2.

[0032] The openings 15 are made and lie on respective flat lateral faces 16, parallel to and opposite each other, of the hollow body 11.

[0033] The annular peripheral edges 17 of the openings 15 are each shaped like a single thread 18 made in the thickness of the respective flat lateral face 16.

[0034] According to a first embodiment, each of the two single threads 18 is obtained in the moulding of the hollow body 11.

[0035] According to a different method, each of the two single threads 18 is obtained by mechanical deformation and caulking of the respective edges 17.

[0036] In both cases, as illustrated in Figure 2, the above-mentioned threaded tubular joints 5 can be screwed directly to the single threads 18. In that case, in each head 3, the two single threads 18 of the hollow body 11 have screwing directions which are different to each other and each joint 5 has, positioned on opposite sides

relative to the middle seal 6, two threaded portions 19 with screwing directions which are different to each other.

[0037] In this way, a rotation of a joint 5 interposed between two adjacent heads 3 determines the screwing of the joint 5 in both the heads 3 (in one case, the screwing is clockwise and in the other case it is anticlockwise), and therefore the mutual moving towards each other of the heads 3 until the fastening together of the seal 6.

[0038] According to a different embodiment of the heads 3 illustrated in Figures 3 to 6, each head 3 comprises, on the other hand, at least one threaded bushing 20 on the relative outer periphery, which is screwed to a respective single thread 18, and a respective sealing gasket 21, in particular in the form of an O-ring, which is interposed and clamped between an outer flange 22 of the threaded bushing 20 and the flat lateral face 16 of the hollow body 11 on which is the single thread 18 is formed.

[0039] If the head 3 belongs to an intermediate module 2 (i.e. not an end module) of the radiator 1, there are two opposite bushings 20, one for each opening 15. More specifically, in that case the head 3 comprises two threaded bushings 20 on the relative outer peripheries, which are each screwed to a respective single thread 18, and two respective sealing gaskets 21, which are each interposed and clamped between the outer flange 22 of the respective threaded bushing 20 and the respective flat lateral face 16 of the hollow body 11 on which the single thread 18 is formed.

[0040] To allow the sealed connection of the heads 3 by means of the joints 5, the bushings 20 are further threaded on the relative inner peripheries with screwing directions different from each other. In that case, the joints 5 have a smaller diameter than those provided in the variant embodiment of Figure 2.

[0041] Considering the fact that the threads 18 of each head 3 have screwing directions which are different to each other, the respective bushings 20 are threaded on the relative outer peripheries with screwing directions which are different to each other. In other words, each head 3 carries, on one side, a bushing 20 with right-hand inner and outer threads, and, on the other side, a bushing 20 with left-hand inner and outer threads. For assembling the radiator 1 there are therefore two series of bushings 20, one with right-hand inner and outer threads and the other with left-hand inner and outer threads.

[0042] If the head 3 belongs to an end module 2 of the radiator 1, there is, on the other hand, a bushing 20 screwed to the thread 18 of one of the two circular openings 15 of the hollow body 11 (or the bushing 20 is absent in the case of direct connection of the heads 3 by means of the joints 5, as illustrated in Figure 2) and, on the other hand, when the other of the two circular openings 15 is closed, an above-mentioned valve 7, 8 (thermostatic or ON/OFF) or a closing element 23.

[0043] The closing element 23 comprises a cap 24 and, depending on its positioning in the radiator 1, may further comprise an air vent valve 25, as illustrated in Figures 7

to 11.

[0044] The cap 24 in turn comprises a flat plate 26 coupled in a sealed fashion, in particular by welding, to the flat lateral face 16 of the hollow body 11, with a relative circular threaded opening 27 concentrically surrounded by the circular opening 15 of the lateral face 16. In other words, the diameter of the opening 27 is less than the diameter of the opening 15.

[0045] The cap 24 also comprises a cylindrical body 28 threaded on its outer periphery, which is screwed to the plate 26 (to the thread of the opening 27), and a sealing gasket 29, in particular in the form of an O-ring, which is interposed and clamped between the plate 26 and an outer flange 30 of the cylindrical body 28.

[0046] According to a variant embodiment not illustrated, the cap 24 comprises a flat plate, coupled in a sealed fashion to the flat lateral face 16 of the hollow body 11, with the relative circular opening arranged to concentrically surround the circular opening 15 of the lateral face 16. In other words, in this case, the diameter of the opening 15 is less than the diameter of the circular opening of the plate.

[0047] In that case, the cap 24 comprises a cylindrical body threaded on the relative outer periphery, which is screwed to the respective single thread of the opening 15, and a first sealing gasket, similar to the seal 29 described above, which is interposed and clamped between the plate and an outer flange of the cylindrical body.

[0048] In this case, moreover, the flat plate may be coupled in a sealed fashion to the flat lateral face of the hollow body by welding or by a second seal, in particular in the form of an O-ring, interposed and clamped between the plate and the relative flat lateral face of the hollow body.

[0049] According to all the variant embodiments described above, making the heads 3 of the radiator 1 comprises the steps of:

- obtaining by die forming a hollow body 11 having an end cap 12 and a side wall 13 which extends from the end cap 12 and finishes with at least two tubular extensions 14 facing the end cap 12; wherein the side wall 13 is equipped with two circular openings 15, which are made and lie on respective flat lateral faces 16, parallel to and facing each other, of the hollow body 11, and are arranged axially aligned with each other along a direction at right angles to the direction of extension of the tubular extensions 14; and
- shaping each of the peripheral edges 17 of the circular openings 15 like a single thread 18 made in the thickness of the respective flat lateral face 16.

[0050] In this process, the shape of the two threads 18, since each is in the form of a single thread, may be obtained in the moulding of the hollow body 11, or it may be obtained by mechanical deformation and caulking of the respective edges 17. In both cases, the making of

the threads 18 is advantageous both in terms of production simplicity and in economic terms.

[0051] Moreover, in this process the two single threads of the hollow body can be made with screwing directions which are different to each other. In this context, the heads 3 may be connected directly to each other by means of the joints 5 described above.

[0052] The making of the heads 3 of the radiator 1 can also comprise the further step of screwing to the single thread 18 of at least one of the two circular openings 15 a respective threaded bushing 20 on the relative outer periphery, interposing and clamping a sealing gasket 21 between an outer flange 22 of the threaded bushing 20 and the flat lateral face 16 of the hollow body 11 on which the single thread 18 is formed.

[0053] In that case, the making of the intermediate heads 3 of the radiator 1 comprises screwing two bushings 20 to the respective single threads 18 opposite each other.

[0054] The making of the end heads 3 of the radiator 1 may also comprise the further step of screwing a closing element 23 to one of the two circular openings 15 of the head 3.

Claims

1. A head for thermal radiators, comprising a hollow body (11) which has an end cap (12) and a side wall (13), which extends from the end cap (12) and finishes with at least two tubular extensions (14) facing the end cap (12); wherein the side wall (13) is equipped with two circular openings (15) axially aligned with each other along a direction at right angles to the direction of extension of the tubular extensions (14); **characterised in that** the circular openings (15) are made and lie on respective flat lateral faces (16), parallel to and facing each other, of the hollow body (11), and **in that** the peripheral edges (17) of the circular openings (15) are each shaped like a single thread (18) made in the thickness of the respective flat lateral face (16).
2. The head for thermal radiators according to claim 1, wherein the shape of each of the single threads (18) is obtained in the moulding of the hollow body (11) or by mechanical deformation and caulking of the respective edges (17).
3. The head for thermal radiators according to claim 1 or 2, wherein the two single threads (18) of the hollow body (11) have the screwing direction different from the other single thread (18).
4. The head for thermal radiators according to any one of claims 1 to 3, comprising at least one threaded bushing (20) on the relative outer periphery, which is screwed to a respective single thread (18), and a

respective sealing gasket (21), which is interposed and clamped between an outer flange (22) of the threaded bushing (20) and the flat lateral face (16) of the hollow body (11) on which is the single thread (18) is formed.

5. The head for thermal radiators according to any one of claims 1 to 4, comprising two threaded bushes (20) on the relative outer peripheries, which are each screwed to a respective single thread (18), and two respective sealing gaskets (21), which are each interposed and clamped between an outer flange (22) of the respective threaded bushing (20) and the respective flat lateral face (16) of the hollow body (11) on which the single thread (18) is formed.
6. The head for thermal radiators according to claim 5, wherein the bushings (20) are further threaded on the relative inner peripheries with screwing directions which are different to each other.
7. The head for thermal radiators according to any one of claims 1 to 4, comprising an element (23) for closing one of the two circular openings (15) of the hollow body (11).
8. The head for thermal radiators according to claim 7, wherein the closing element (23) comprises an air vent valve (25).
9. The head for thermal radiators according to claim 7 or 8, wherein the closing element comprises:
 - a flat plate coupled in a sealed fashion to the flat lateral face (16) of the hollow body (11), with the relative circular opening arranged to concentrically surround the circular opening (15) of the lateral face (16);
 - a cylindrical body threaded on the relative outer periphery, which is screwed onto the respective single thread (18); and
 - a sealing gasket, which is interposed and clamped between the plate and an outer flange of the cylindrical body.
10. The head for thermal radiators according to claim 9, wherein the flat plate is coupled in a sealed fashion to flat lateral face (16) of the hollow member (11) by welding or by a respective sealing gasket which is interposed and clamped between the plate and the respective flat lateral face (16) of the hollow body (11).
11. The head for thermal radiators according to claim 7 or 8, wherein the closing element (23) comprises:
 - a flat plate (26) coupled in a sealed fashion, in particular by welding, to the flat lateral face (16)

of the hollow body (11), with a relative circular threaded opening (27) concentrically surrounded by the circular opening (15) of the lateral face (16);

- a cylindrical body (28) threaded on the relative outer periphery, which is screwed to the plate (26); and
- a respective sealing gasket (29), which is interposed and clamped between the plate (26) and an outer flange (30) of the cylindrical body (28).

12. A method for making a head for thermal radiators, comprising the steps of:

- obtaining by die forming a hollow body (11) having an end cap (12) and a side wall (13) which extends from the end cap (12) and finishes with at least two tubular extensions (14) facing the end cap (12); wherein the side wall (13) is equipped with two circular openings (15), which are made and lie on respective flat lateral faces (16), parallel to and facing each other, of the hollow body (11), and are arranged axially aligned with each other along a direction at right angles to the direction of extension of the tubular extensions (14); and
- shaping each of the peripheral edges (17) of the circular openings (15) like a single thread (18) made in the thickness of the respective flat lateral face (16).

13. The method according to claim 12, wherein the shape of each of the two single threads (18) is obtained in moulding of the hollow body (11) or by mechanical deformation and caulking and of the respective edges (17).

14. The method according to claim 12 or 13, wherein the two single threads (18) of the hollow body (11) are made with screwing directions which are different to each other.

15. The method according to any one of claims 12 to 14, comprising the further step of screwing to the single thread (18) of at least one of the two circular openings (15) a respective threaded bushing (20) on the relative outer periphery, interposing and clamping a sealing gasket (21) between an outer flange (22) of the threaded bushing (20) and the flat lateral face (16) of the hollow body (11) on which the single thread (18) is formed.

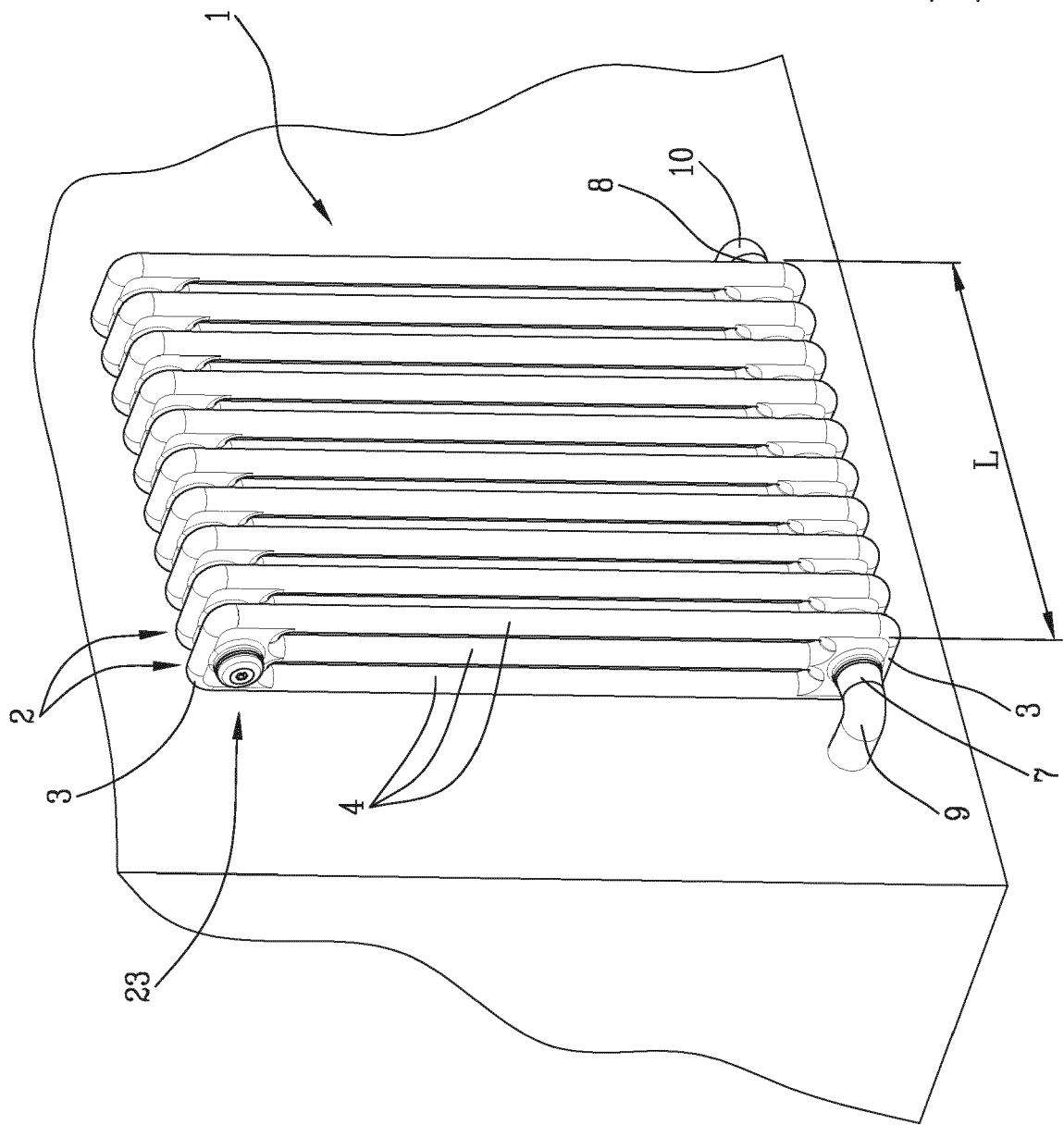


Fig.1

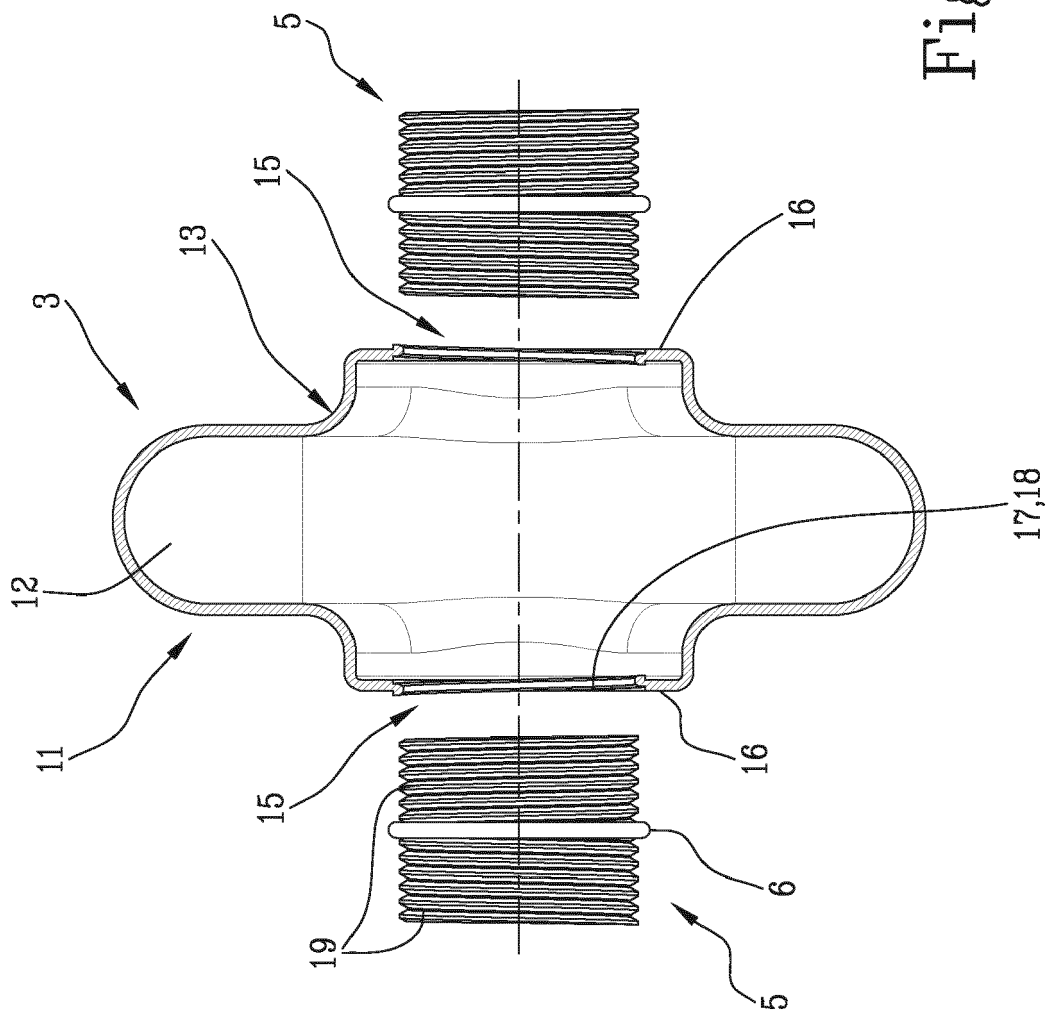


Fig. 2

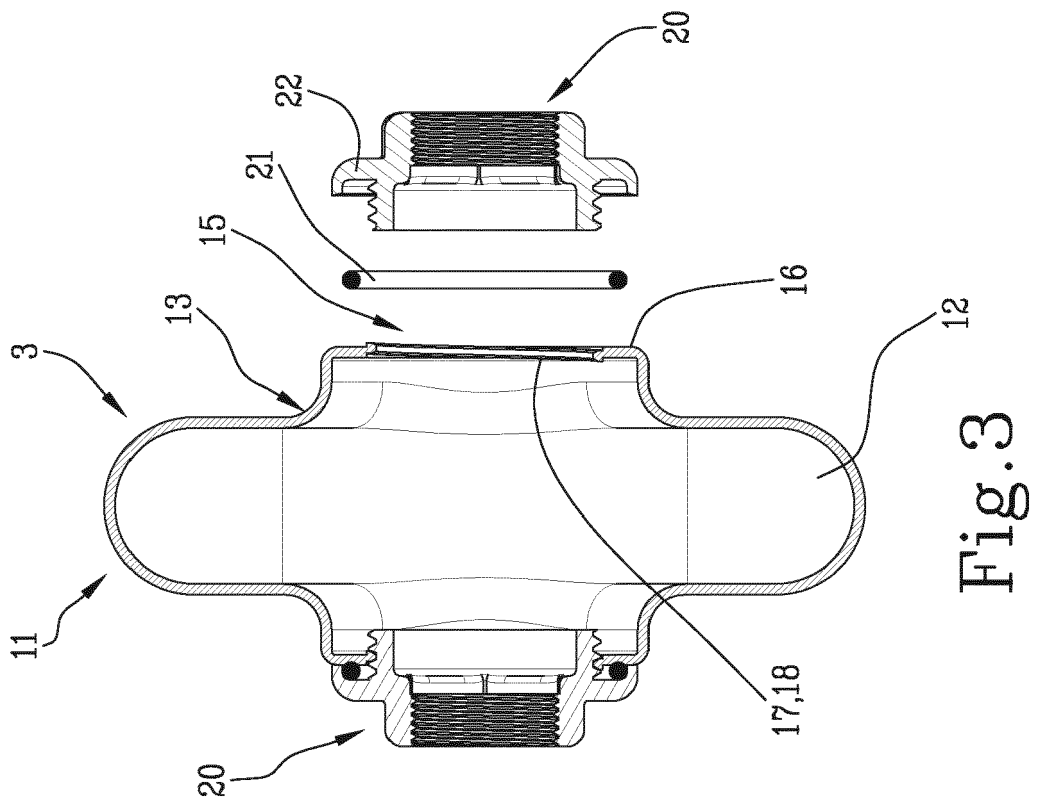


Fig. 3

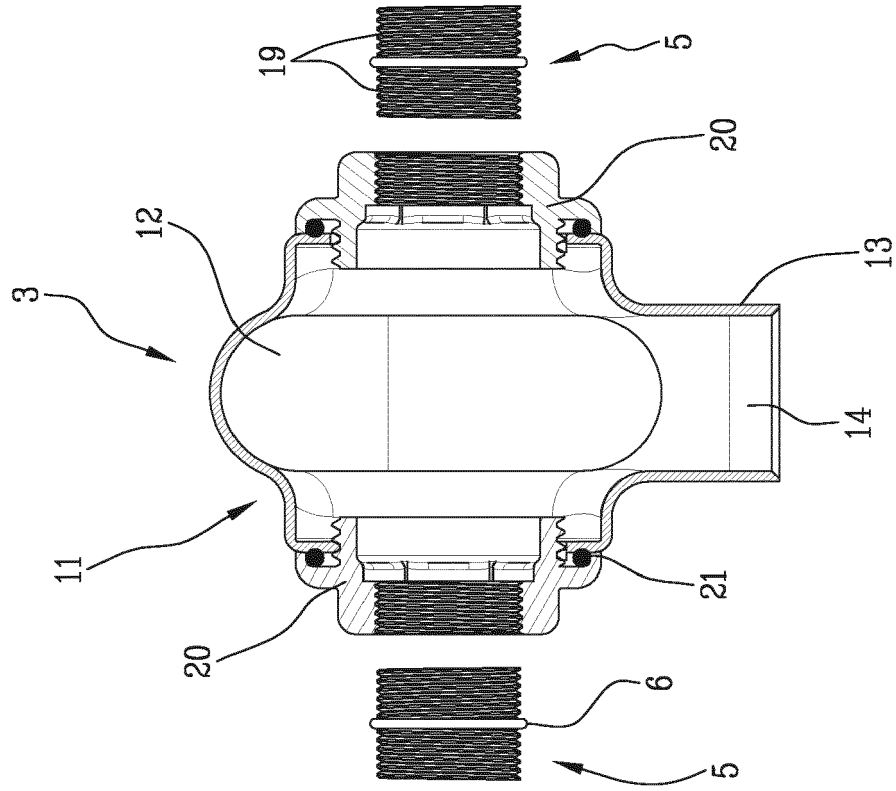


Fig. 4

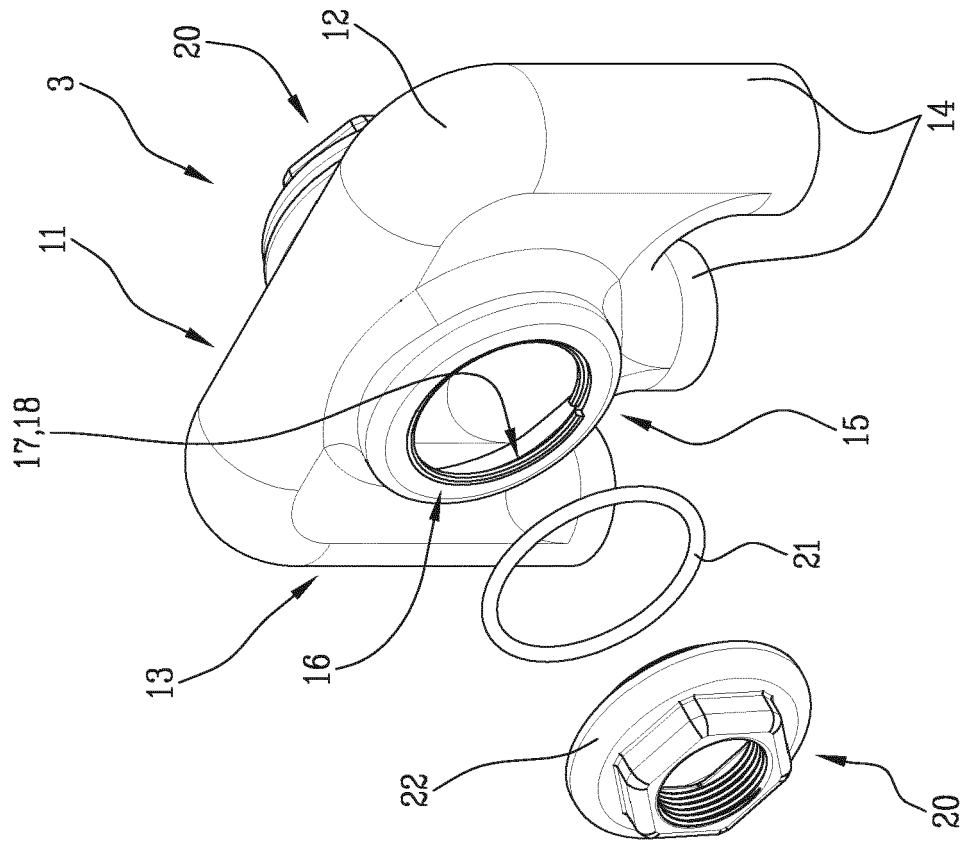


Fig. 5

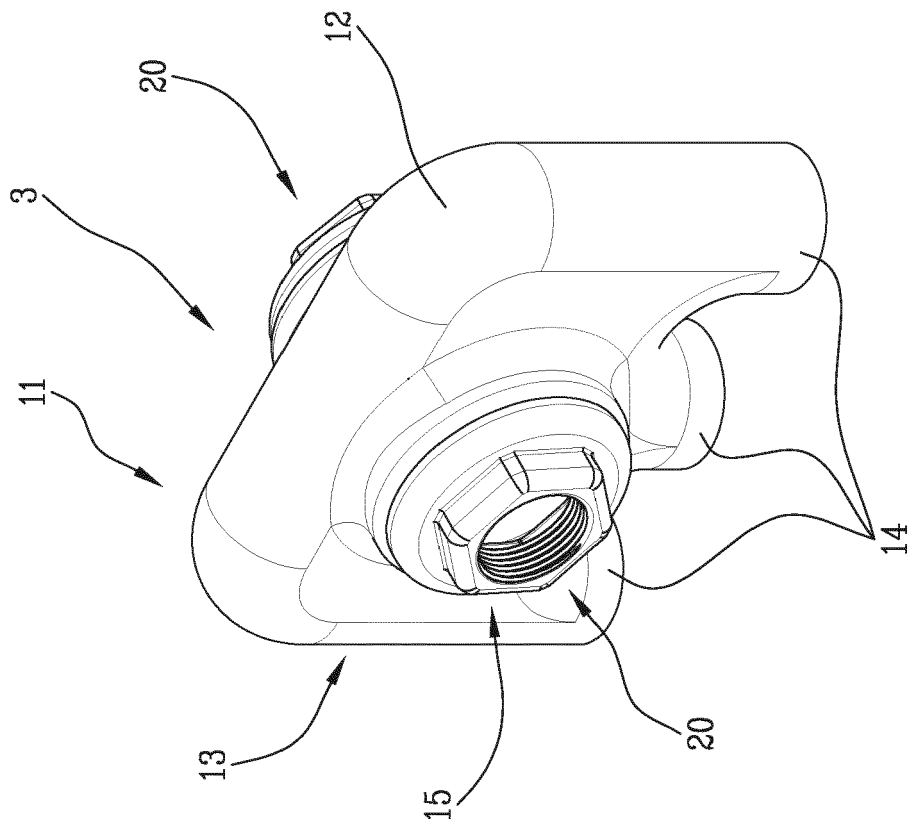


Fig. 6

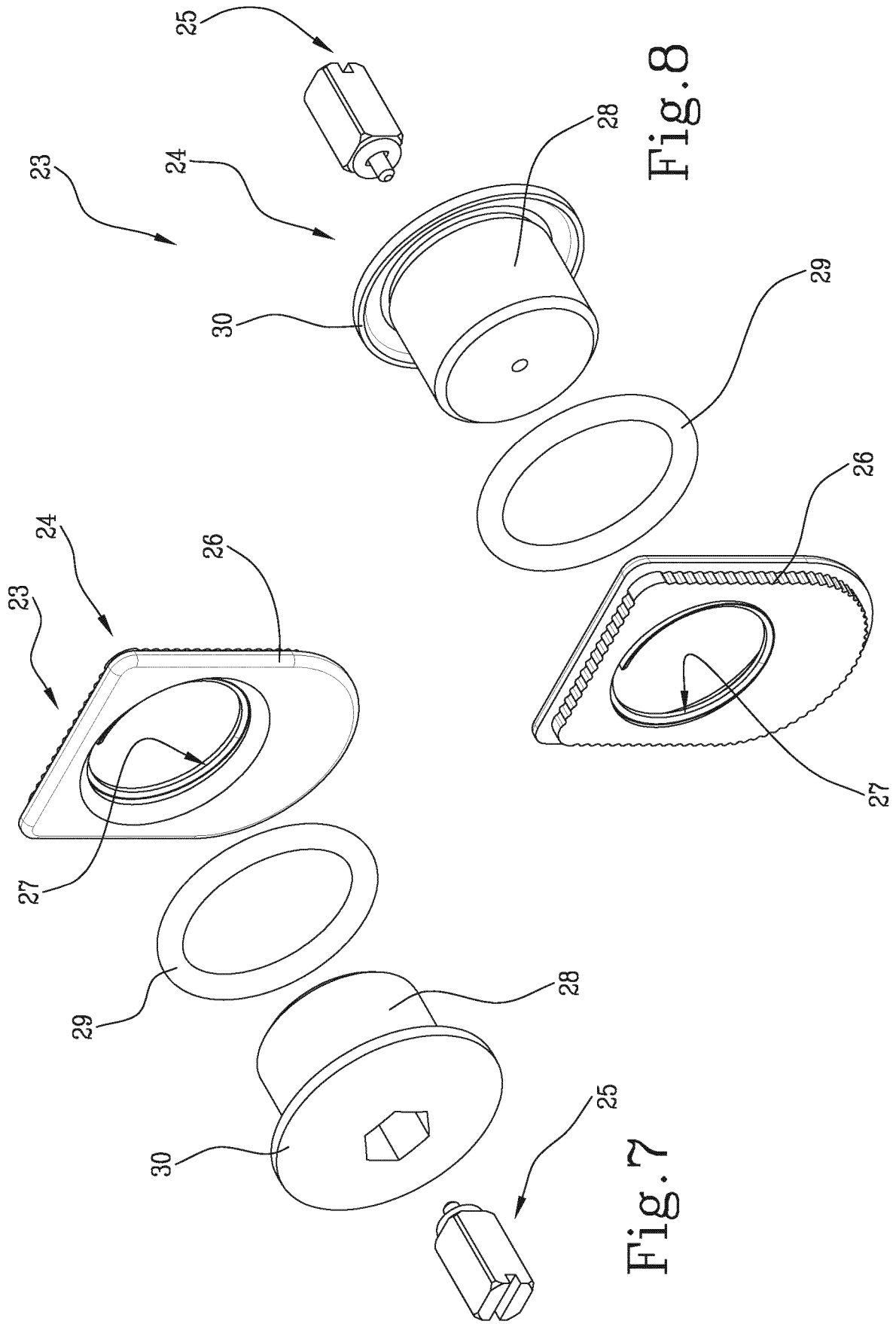


Fig. 8

Fig. 7

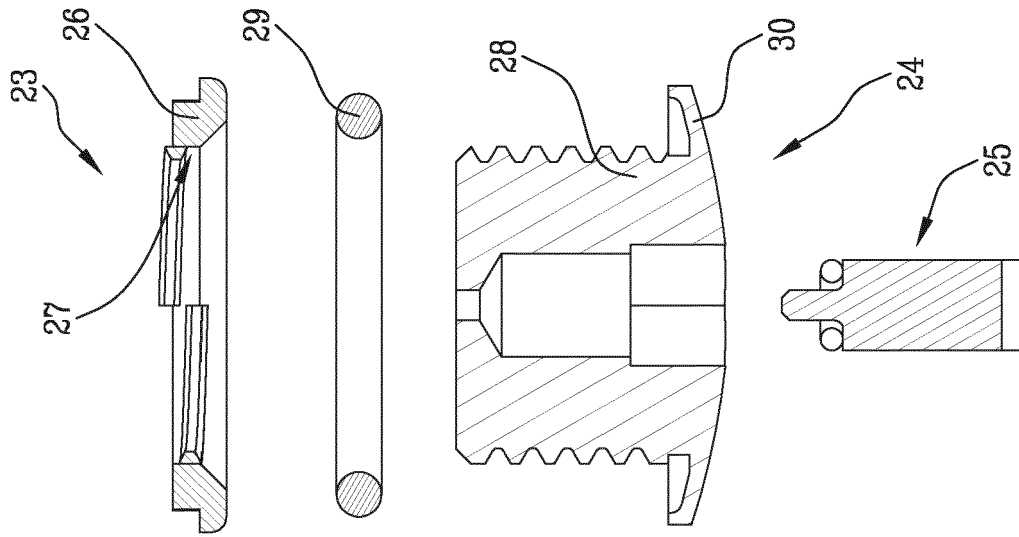


Fig.11

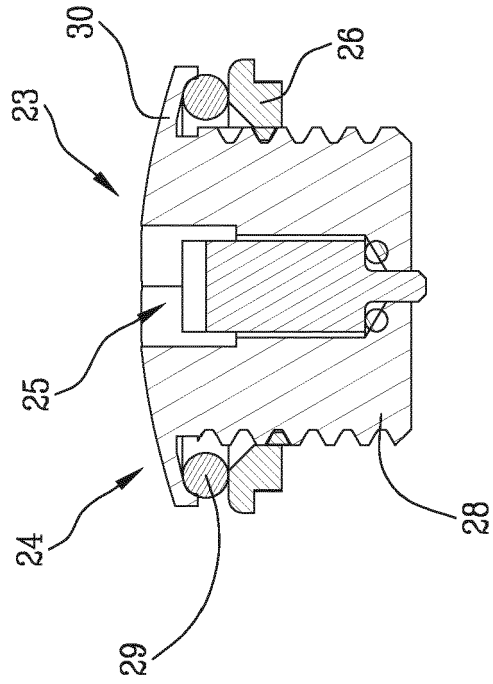


Fig.10

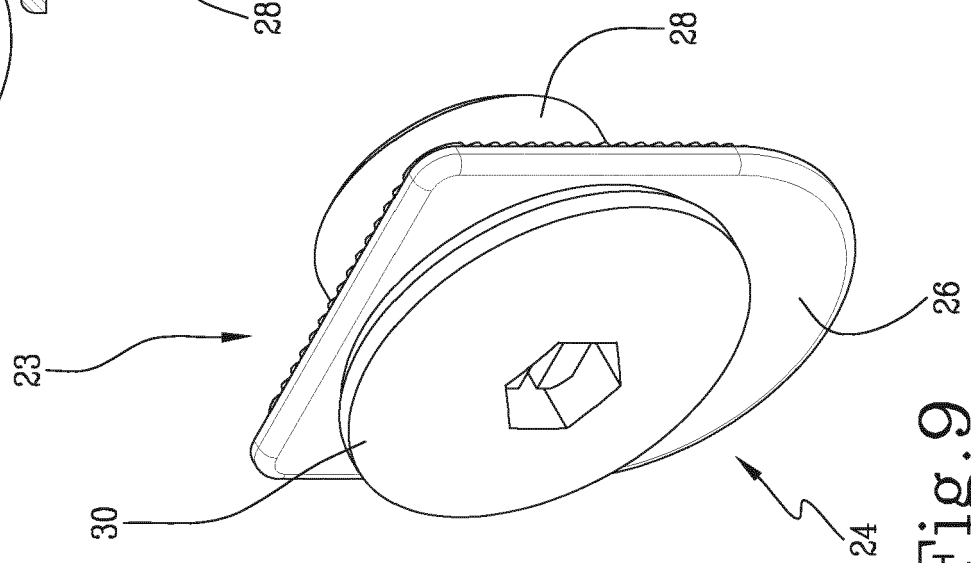


Fig.9



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Place of search Munich		Date of completion of the search 15 June 2020	Examiner Jessen, Flemming
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