(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 113 047 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.01.2023 Bulletin 2023/01

(21) Application number: **22182518.5**

(22) Date of filing: **01.07.2022**

(51) International Patent Classification (IPC):
F28D 1/053 *(2006.01)* ***A47K 10/06*** *(2006.01)*
F24D 19/00 *(2006.01)* ***E05F 1/12*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
F28D 1/053; A47K 10/06; E05F 1/1292; F24D 19/008; F24D 2220/2009; F28D 2021/0036; F28F 2280/105

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **01.07.2021 IT 202100017336**

(71) Applicant: **Cordivari S.r.l.**
64020 Morro D'Oro (TE) (IT)

(72) Inventor: **DIODORO, Gianluca**
64020 MORRO D'ORO (TE) (IT)

(74) Representative: **Mulas, Chiara et al**
Barzanò & Zanardo Roma S.p.A.
Via Piemonte, 26
00187 Roma (IT)

(54) HEATED TOWEL RAIL RADIATOR

(57) The present invention concerns a heated towel rail radiator (1) comprising a fixed body (2) and at least one support element (3) for hand towels, said at least one support element (3) being constrained in rotation to said fixed body (2) through at least one hinge (5) on which articulation means (7) are acting, which are configured in such a way as to act on said support element (3) to make it rotate along an axis of rotation (y) relative to said fixed body (2) between a closed position and at least one open position, wherein it is rotated by an angle greater than and not equal to 0°, preferably up to 45°, said radiator (1) being characterised in that said articulation means (7) comprise a connecting rod (11), associated with said hinge (5) by means of a timed coupling, and a linear actuator (12) acting on said connecting rod (11) and constrained to said fixed body (2).

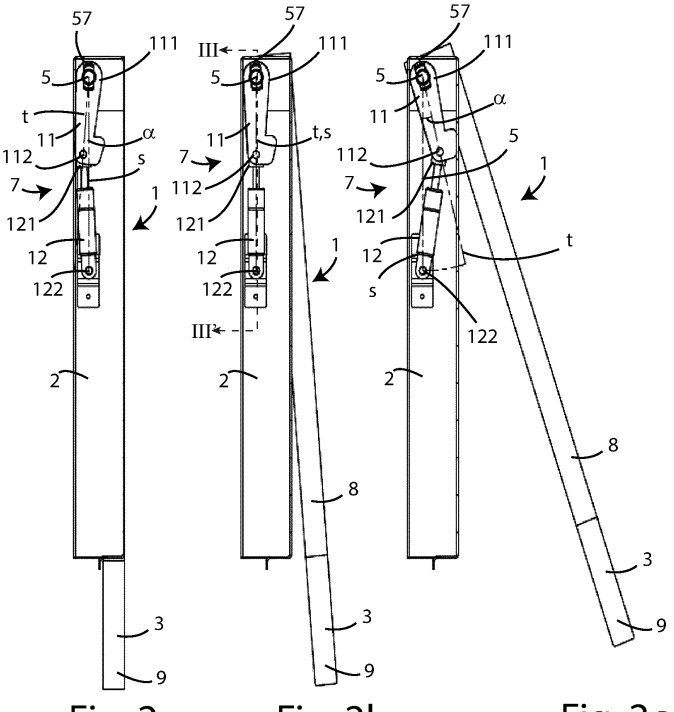

Fig. 2a Fig. 2b Fig. 2c

EP 4 113 047 A1

Description

[0001] The present invention concerns a heated towel rail radiator.

[0002] More precisely, the present invention concerns a heated towel rail radiator able to support towels or hand towels.

[0003] By heated towel rail radiator, we mean that radiator combining the heating functionality with the furnishing design.

[0004] In the state of the art, so-called towel warmer radiators, generally used for bathroom furnishings, are known. Such radiators generally have two vertical manifold pipes and a plurality of horizontal radiant elements arranged between said manifold pipes. Such radiant elements, in addition to heat the environment, can be used as supports on which towels can be placed, both for supporting them, and for heating them before their use or for drying them.

[0005] Heated towel rail radiator equipped with a heating plate having a heating flat external surface, which creates an effect of clean shapes and reduced overall dimensions in depth, are also known. An example is the Applicant's line of Extra-slim® radiators. This type of radiator, although highly appreciated for its elegant design, has the drawback that it cannot be easily used for supporting towels, as it has few surfaces suitable for supporting them.

[0006] Just to overcome such needs, the Applicant filed the Italian patent for utility model n. IT 2018000003428 U describing a heated towel rail radiator, preferably of heating plate type, having a support element for towels configured in such a way as to rotate relative to the heating body from a rest position, wherein it remains within the overall dimensions of the radiator, and a second position wherein it protrudes relative to the front face of the heating body.

[0007] However, the mechanism for moving such support element is a lever acting on the arm and visible when the support element is rotated relative to the heating body, creating an aesthetic effect not appreciated by the market.

[0008] Furthermore, such support element does not have a heating function too, thus not being able to heat the hand towel or garment resting on it.

[0009] An aim of the present invention is to solve the issues of the radiators of the known technique, obtaining a radiator which keeps intact the clean shapes, integrating all the functional elements.

[0010] Furthermore, an aim of the present invention is to obtain a radiator comprising at least one element for supporting hand towels which is also a heating element.

[0011] It is an object of the present invention a heated towel rail radiator comprising a fixed body and at least one support element for hand towels, said at least one support element being constrained in rotation to said fixed body by at least one hinge on which articulation means are acting which are configured in such a way to act on said support element to make it rotate along an axis of rotation relative to said fixed body between a closed position and at least one open position, wherein it is rotated by an angle greater than and not equal to 0°, preferably up to 45°, said radiator being characterised in that said articulation means comprise a connecting rod, associated with said hinge by means of a timed coupling, and a linear actuator acting on said connecting rod and constrained to said fixed body.

[0012] In particular, according to the invention, said linear actuator can be a pneumatic cylinder, in particular a gas spring.

[0013] Still according to the invention, said linear actuator and said connecting rod can be configured in such a way that when said support element is in said open position or in said closed position, the linear actuator exerts a thrust force greater than the force exerted on said connecting rod by the weight of said support element.

[0014] Always according to the invention, the connecting rod can have a first fixed end constrained in rotation with said hinge, and a second end, opposite to the first end, in that said linear actuator can have a first end, constrained in rotation to said second end of said connecting rod, and a second fixed end constrained in rotation with said fixed body of the radiator, in that when said support element is in said closed position the first axis passing through the ends of said connecting rod can be oriented by a first angle lower than 0°, preferably up to -10°, in particular equivalent to -5°, relative to a second fixed axis passing through the fixed ends of said connecting rod and said linear actuator and in that when said support element is in said open position, said first angle can be greater than 0°, preferably between 15° and 45°, preferably equivalent to 20°.

[0015] Further according to the invention, said connecting rod can have a timed seat and said hinge can have a hinge having a timed pin shaped in such a way as to couple and fit firmly into said timed seat of the connecting rod.

[0016] In particular, according to the invention, said timed seat of said connecting rod can comprise at least one indentation having an axis of symmetry, said axis of symmetry being oriented relative to said first axis of the connecting rod by a fixed angle, equivalent to said first angle when said support element is in said closed position, preferably equivalent to -5°.

[0017] Furthermore, according to the invention, given the following parameters:

LB [mm] = distance between the fulcrums or ends of the connecting rod;
H [mm] = height of the support element;
F_s [N] = thrust force of the linear actuator;
α = said first angle;
P [kg] = weight of the support element;

k = safety coefficient = 1,3
D_1f (H;α) = arm of the load acting on said support element;
D_2f (LB; α) = arm of the linear actuator;
the relationship between them can be indicated by the following formula:

$$2 \cdot F_s \cdot D_2 f(LB;\alpha) = P \cdot D_1 f(H;\alpha) \cdot k$$

[0018] Still according to the invention, said hinge can have a fixed seat integral with the fixed body of the radiator, a mobile seat integral with the support element and a hinge fitted into both seats coaxially with the axis of rotation of the hinge and integrally coupled to the mobile seat of the support element in such a way that when the support element passes from said closed position to said open position, and vice versa, said hinge rotates on said axis of rotation relative to the fixed seat of the fixed body.

[0019] Preferably according to the invention, said radiator can comprise first heating means housed in said fixed body, preferably second heating means are housed in said support element and can be connected to said first heating means using connection means.

[0020] Still according to the invention, said hinge can have a hollow pivot along the axis of rotation and can provide first heating means in said fixed body and second heating means in said support element and connection means between said first and second heating means passing through said hollow pivot.

[0021] Always according to the invention, said first heating means, and possibly said second connection means, can be hydraulic ducts in fluidic connection with each other for the passage of a heated heat transfer fluid.

[0022] In particular, according to the invention, said radiator can comprise a plurality of first ducts arranged in said fixed body, at least one second duct arranged in said support element and an intermediate duct for the passage of the heat transfer fluid between said first ducts and said at least one second duct, said intermediate duct passing through said hollow pivot and a connection duct between said intermediate duct and said second duct.

[0023] More specifically, according to the invention, said connection duct can be an elbow fitting or a flexible pipe arranged in the rear face of said radiator.

[0024] Further according to the invention, said connection duct can be obtained in a striking portion of the support element or in a separate body solidly coupled, in particular welded, to the support element.

[0025] Always according to the invention, said intermediate duct can comprise a first portion, arranged in said fixed body, and a second connection portion passing through said hollow pivot and which can have threaded ends, in that it provides a linear hydraulic connection in fluidic communication and straddling said first portion of the intermediate duct and the first end of said second connection portion of the intermediate duct, to which it is screwed, and in that the second end of said second connection portion is screwed onto a threaded seat obtained in said striking portion.

[0026] Still according to the invention, said support element can be formed by shaped sheets having a thin thickness, inside which the at least one second duct is housed and it is fixed to them by means of a plurality of shaped fins adapted to lock the duct in place and at the same time acting as thermal bridges between the second duct and the sheets.

[0027] Preferably according to the invention, the fluidic connection between the plurality of first ducts arranged in the fixed body and the at least one second duct arranged in the support element (3) can take place in series.

[0028] In particular, according to the invention, said radiator can comprise a delivery duct arranged in the fixed body for entering the heated heat transfer fluid and in fluidic connection with the at least one second duct arranged in said support element through at least one intermediate duct, said second duct being in fluidic communication with the plurality of first ducts arranged in said fixed body by means of a delivery manifold, said second ducts being in fluidic communication with an outlet manifold in turn in fluidic connection with the return duct for exiting the heat transfer fluid from the radiator.

[0029] More specifically, according to the invention, said plurality of second ducts can be in fluidic connection with each other in parallel through said delivery and outlet manifolds.

[0030] Alternatively or in combination, according to the invention, said heating means can be a radiant system with thermal resistances connected to a power unit, preferably arranged in the fixed body, and controlled by a control unit, in particular a chronothermostat, preferably a radio frequency chronothermostat.

[0031] Finally, according to the invention, said support element can have a substantially "U" shape having two first arms or vertical arms and a second arm or horizontal arm, substantially perpendicular to the first arms, wherein the two first arms or vertical arms have an end constrained in rotation to said fixed body on the respective hinge.

[0032] The invention will now be described for illustrative but not limitative purposes, with particular reference to the drawings of the attached figures, where:

Figure 1 shows a front view of the radiator according to the invention in a first embodiment;
Figures 2A, 2B and 2C show side sectional views along the section plane II - II' of the radiator of Figure 1 in three different opening steps of the support element relative to the fixed body of the radiator from a closed position to an

open position;
Figure 3 shows a sectional view along the section plane III of the radiator of Figure 2B, in a first variant of the connection system of the radiator;
Figure 4 shows a top view of a detail of the radiator of Figure 3;
Figure 5 shows a sectional view along the section plane III of the radiator of Figure 2B, in a second variant of the connection system of the radiator;
Figures 6 and 7 show a rear view of the radiator of Figure 5 with and without the cover of the connection system;
Figure 8 shows a front view of the radiator of Figure 1 with a first connection scheme of the radiating elements of the radiator;
Figure 9 shows a sectional view along the section plane III of the radiator of Figure 2B, in a third variant of the connection system of the radiator;
Figure 10 shows a front view of the detail of Figure 9;
Figure 11 shows a sectional view along the section plane III of the radiator of Figure 2B, in a fourth variant of the connection system of the radiator;
Figure 12 shows a front view of the detail of Figure 11;
Figure 13 shows the side sectional view of the radiator of Figure 2c with the scheme of the applied forces;
Figure 14 shows an exploded perspective view of the connection system of Figure 11;
Figure 15a shows a perspective view of the pivot and connecting rod assembly of the connection system of Figure 14;
Figure 15b shows a front view of the assembly of Figure 15a when the radiator according to the invention is in the intermediate position of Figure 2b;
Figure 15c shows a side view of the assembly of Figure 15a;
Figure 15d shows a rear view of the assembly of Figure 14 when the radiator according to the invention is in the closed position of Figure 2a;
Figures 16a and 16b show front and rear perspective views of a second embodiment of the radiator according to the invention;
Figure 17a shows an exploded perspective view of the support element of the radiator of Figure 16a;
Figure 17b shows a partial exploded and sectional perspective view of the support element of the radiator of Figure 16a;
Figures 18a and 18b show front and rear perspective views of a third embodiment of the radiator according to the invention;
Figure 19 shows a rear perspective view of the radiator of Figure 18b without the rear cover plate; and
Figure 20 shows a front sectional view along the section plane XX of the radiator of Figure 19.

[0033] Referring to Figures 1 - 3, we observe a radiator for heated towel rail radiator according to the invention, in a first embodiment, and indicated with the numerical reference 1.

[0034] Said radiator 1 provides a fixed body 2 and at least one support element 3 for towels, hand towels, garments or other equivalent objects.

[0035] In embodiments, not shown here, the radiator 1 can also comprise several support elements.

[0036] In the first embodiment shown in Figures 1 and 2a - 2c, the radiator 1 is of the heating plate type wherein the fixed body 2 has a uniform, substantially flat external surface, for example the radiator 1 can be of the Applicant's EXTRA-SLIM® type line. In other embodiments the fixed body 2 can be configured differently.

[0037] The support element 3 is constrained in rotation to said fixed body 2 by means of at least one hinge 5 and is configured in such a way as to rotate relative to said fixed body 2, in correspondence of said at least one hinge 5, so as to be in able to switch between a closed position (shown in Figure 2A) and one or more open positions, wherein it is rotated by an angle greater than and not equal to 0°, preferably up to 45°, in particular by approximately 20° (shown in Figure 2c), relative to the closed position, wherein it protrudes outwards beyond the depth dimension of the radiator 1, and vice versa.

[0038] In fact, as can be seen from the attached figures, in the closed position the support element 3 does not substantially increase the depth dimension of the radiator 1, containing its overall dimensions and, thanks to the tilting motion in the open position, it allows the use of the support element 3 as a hanger according to the user's need.

[0039] When the fixed body 2 is of the heating plate type, as shown in the figures, said support element 3 can also have a substantially flat shape so that when it is in the closed position, its external surface is substantially coplanar with the external flat surface of the heating body 2.

[0040] Preferably, as shown in the figures, said at least one support element 3 can have a substantially "U" shape having two first arms or vertical arms 8 and a second arm or horizontal arm 9, substantially perpendicular to the first two arms 8, wherein the two first arms or vertical arms 8 have one end constrained in rotation on the respective hinge 5.

[0041] The horizontal arm 9 is then used as a hanger to support any towel 4.

[0042] In the first embodiment, the radiator 1 is arranged in such a way that, in the closed configuration of the radiator

1, the concavity of the "U" shape of the support element 3 faces upwards, and therefore the horizontal arm 9 is arranged in correspondence of the lower portion of the radiator 1, however in other embodiments, the concavity could be facing downwards, creating a *vasistas* opening of the support element 3 relative to the fixed body 2, or facing towards the sides , so that the towels can be supported by the first arms 8 of the support element 3, becoming two hangers.

[0043] In other embodiments not shown, said at least one support element 3 can have at least an "L" -shaped portion whose first arm or vertical arm 8 has an end constrained in rotation on the hinge 5 and the second arm or horizontal arm 9, substantially perpendicular to the first arm 8, can be adapted for example to support a towel 4.

[0044] Furthermore, the radiator 1 provides articulation means 7 for moving the support element 3 capable of articulating the motion of the support element 3 relative to the fixed body 2 and capable of locking the at least one support element 3 in place at least in said open position of Figure 2C. Only through the action of a user, in particular by pushing the support element 3 towards the fixed body 2, it can be closed again.

[0045] This allows to prevent the support element 3 from inadvertently closing by itself.

[0046] The means for articulating the motion 7 are provided in correspondence of and are acting on said at least one hinge 5.

[0047] Said means for articulating the motion 7 comprise a two-stage connecting rod 11 constrained in rotation at a first end 111 on the hinge 5 and in correspondence of the second end 112 on the first end 121 of a linear actuator 12, preferably a pneumatic cylinder 12, in particular a spring gas 12, in turn pivoted, in particular constrained in rotation, at its second end 122 on the fixed body 2 of the radiator 1.

[0048] These means for articulating the motion 7 allow to determine the maximum opening width of the support element 3 relative to the fixed body 2.

[0049] Preferably, the pneumatic cylinder 12 can have a thrust force which varies according to the width of the radiator 1, such thrust force can be between 200 N ÷ 350 N.

[0050] Both in the open and closed position the support element 3 exploits the force exerted by the linear actuator 12. When the support element 3 is in the open position, the linear actuator 12 is opposed to the weight of the support element 3, in addition to the possible weight of the hand towels, while when the support element 3 is in the closed position it exploits the thrust force Fs of the linear actuator 12 to keep the support element 3 firmly closed.

[0051] As shown in particular in Figure 3, the hinge 5 provides a fixed seat 51 integral with the fixed body 2 of the radiator 2, a mobile seat 53 integral with the support element 3 and a pivot 52 fitted into both seats 51 and 53 coaxially to the axis of rotation y of the hinge 5. Furthermore, the pivot 52 is integrally coupled to the mobile seat 53 of the support element 3, in such a way as to be able to rotate on said axis of rotation y relative to the fixed seat 51 of the fixed body 2.

[0052] Preferably, the mobile seat 53 and the pivot 52 have a respective radial opening 54 and 55 through which fastening means 56 are fitted between the two elements, in particular said radial openings 54 and 55 are threaded and the fastening elements are a screw 56.

[0053] Preferably, the pivot 52 is hollow along the axis of rotation y of the hinge 5. Furthermore, the pivot 52 is preferably made of brass.

[0054] Again, the pivot 52 has a timed pin 57 adapted to fit into a respective timed hole 113 obtained at the first end 111 of the timed connecting rod 11.

[0055] The mutual position of the parts (connecting rod 11 and linear actuator 12), shown with particular reference to Figures 2b and 2c, has been evaluated in such a way as to benefit from the inversion of the torsional moment produced by the gas spring 12 during the angular excursion of the handle 3. This is to have both a push when the handle 3 is open and a return action when it is closed.

[0056] In particular, the angle α between the first axis t of the connecting rod 11, in other words the first axis t equivalent to the axis passing between the two ends 111 and 112 of the connecting rod 11, and the second axis or fixed axis s passing through the rotation fulcrum 111 of the connecting rod 11 and the rotation fulcrum 122 of the linear actuator 12 is -5°, when the radiator is in the closed position of Figure 2A, and +20° when the radiator 1 is in the open position of Figure 2C.

[0057] More generally, when the radiator 1 is in the closed position of Figure 2, the angle α can be lower than 0°, preferably up to -10°.

[0058] In other embodiments, said angle α, in the open position, can be between 15° and 45°.

[0059] In particular, as can be seen from Figure 2a, the linear actuator 12 recalls the support element 3 to close. Following the user action on the support element 3, passed the point where the first axis t and the second axis s are aligned (shown in Figure 2b) the linear actuator 12 pushes and supports the support element 3 while opening until it reaches the opening position shown in Figure 2c. The mutual position of the parts, in particular of the connecting rod 11 and of the linear actuator 12, has been evaluated in such a way as to be able to benefit from the inversion of the torsional moment produced by the gas spring 12 during the angular excursion of the support element 3. This allows to obtain both a push when the support element 3 is open and a return action when it is closed.

[0060] Such excursion of the reciprocal motion between the connecting rod 11 and the linear actuator 12 is obtained, in particular, thanks to the orientation of the timed coupling between the pivot 52 and the connecting rod 11, as better

shown in Figures 15a - 15d, even if for a different variant of the connection system.

[0061] This timed coupling allows to obtain a suitable timing so that the motion is regulated in its kinematics.

[0062] By timed coupling we mean a coupling wherein there is an inclination constraint between two elements that always maintain the same inclination between them between their respective axes of symmetry.

[0063] In particular, the connecting rod 11, preferably made of steel sheet, has a timed seat 113, in correspondence of the first end 111 or fulcrum of rotation of the connecting rod 11, oriented along its own axis of symmetry s' by an angle α', preferably equivalent to -5°, relative to the first axis t of the connecting rod 11, allowing the connecting rod 11 to be fitted onto the hub or timed pin 57 of the pivot 52 at said angle α' in order to respect the kinematic chain of the required motion.

[0064] The timed seat 113 and the hub or timed pin 57 of the pivot have such a shape as to prevent the reciprocal rotation and therefore the fixed coupling.

[0065] In particular, said timed seat of said connecting rod comprises at least one indentation 114 having an axis of symmetry s', said axis of symmetry s' being oriented relative to said first axis t of the connecting rod 11 by a fixed angle α', equivalent to said first angle α when said support element (3) is in said closed position, preferably equivalent to -5°.

[0066] In the specific embodiment they have a circular shape provided with two wing-shaped indentations 114 obtained along said axis of symmetry s'. Possibly a single indentation 114 could be obtained, also arranged in a different position, provided that it locks the reciprocal orientation between the connecting rod 11 and the pivot 52, preventing their reciprocal rotation.

[0067] Depending on the depth of the structure, the weight of the support element, the length of the connecting rod and the force chosen for the linear actuator, in particular of the gas spring, it is possible to cover angular excursions greater than those defined for the radiator according to the described embodiment.

[0068] In particular, referring to the scheme in Figure 13, it can be observed that there is a relationship capable of evaluating the equilibrium of the forces exchanged as a function of the geometry of the kinematics.

[0069] In particular in Figure 13 the following parameters are observed

L_B [mm] = length of the connecting rod 11, in particular the distance between the fulcrums or ends 111, 112 of the connecting rod 11;
H [mm] = height of the support element 3;
L [mm] = width of the support element 3, useful for obtaining the weight of the support element 3;
F_{Spring} [N] = force of the gas spring 12, or thrust force F_s of the linear actuator 12;
α = angle of rotation of the support element 3;
P_{Man} [kg] = structural weight of the support element 3;
P_{Liq} [kg] = weight of the fluid contained in the support element 3;
k = safety coefficient = 1,3
$D_1f\ (H;\alpha)$ = arm of the load acting on the support element 3;
$D_2f\ (L_B;\alpha)$ = arm of the gas spring 12.

[0070] Given such parameters, the relationship between them is indicated by the following formula:

$$2 \cdot F_{Spring} \cdot D_2f\ (L_B;\alpha) = (P_{Man} + P_{Liq}) \cdot D_1(H;\alpha) \cdot k$$

[0071] The sum of $P_{Man} + P_{Liq}$ is equivalent to the weight P of the support element 3.

[0072] In the specific embodiment wherein the support element 3 has a "U" shape, the articulation means 7 are arranged in correspondence of both hinges 5, both for reasons of symmetry and for chances of applying constraining forces and reactions.

[0073] Thanks to the solution according to the invention, the kinematics acts directly on the hinge 5 and can be placed in the fixed body 2, in particular, behind or next to the heating plate, so as not to be visible when using the radiator 1.

[0074] Thanks to the developed motion system, in the radiator according to the invention the components regulating the motion of the support element 3 are advantageously hidden in the rear part of the radiator 1, remedying their unaesthetic appearance.

[0075] The pivot and the connecting rod were the object of a particular research and attention, since the whole mechanism had to be concentrated within the size limits typical of the product (depth of only 45 mm), solving the issue of a regulated motion and obtaining an access route for the hydraulic connections to the appendix.

[0076] Thanks to the radiator kinematics, the following functions are advantageously obtained:

- keeping the system in place in the closed configuration;
- opening the system after the user has manually extracted the arm of a space such as to overcome the "dead spot";

- keeping the system in the open position;
- performing a "damping" action of the system rotations.

[0077] Furthermore, according to the invention, preferably the support element 3 of the radiator 1 can be heated by the hydraulic passage of the heat transfer fluid coming from the fixed and heating body 2 of the radiator 1.

[0078] In a first variant of the means for connecting the radiator 1 according to the invention, shown in Figure 4, a connection can be provided between the ducts passing through the fixed body 2 and the duct fitted into the support element 3 by means of external flexible ducts 13 of connection to the structure of the radiator 1, in particular, passing through the rear portion of the radiator 1. Such solution allows to join the ducts in a simple and effective way. Such ducts are in fluidic connection with each other, preferably in parallel.

[0079] However, it can be seen from a top or side view of the radiator 1.

[0080] In order to also hide the external means of connection to the radiator body, and to improve the efficiency of this connection, a second embodiment variant has been developed, shown in Figures 5 - 7.

[0081] The second variant of the hydraulic connection system is arranged in correspondence of the hinge 5 of the previously described motion system 7.

[0082] This is made possible in particular in that the mobile pivot 52 of the hinge 5 is hollow and therefore it is possible through it to allow the passage of a duct capable of putting the ducts of the fixed body 2 in fluidic communication with the duct passing through the support element 3.

[0083] In particular, inside the hollow pivot 5 there is an intermediate duct 14 coaxially arranged inside it, which in the embodiment shown coincides with a delivery or return pipe 14 in fluidic connection with the duct arranged in the support element 3.

[0084] Such delivery or return pipe 14 is preferably a copper pipe for entering or exiting the heat transfer fluid in the support element 3 and coming from the ducts arranged in the fixed body 2 of the radiator 1 or directly from the external delivery of the hot heat transfer fluid.

[0085] Furthermore, the connection means according to the second variant provide a connection duct 15, in particular a connection duct 15 with a 90° elbow, capable of connecting the delivery/return pipe 14 with the duct passing through the support element. 3.

[0086] Preferably, as shown in Figure 7, a covering element 16, in particular a sheet metal casing 16, can be provided to cover the connection duct 15 in the rear portion of the radiator 1.

[0087] To obtain the expected result, an elbow fitting duct 15 screwed onto the support element duct 3 was used. The elbow fitting duct 15 can be selected in such a way as to allow the connection with copper or technopolymer pipes.

[0088] The intermediate duct 14 passes through the hollow pivot 5. In this case, the degree of freedom offered by the connection duct 15 is exploited to allow the rotation of the pipe during motion of the support element 3. The connection duct 15 allows the axial rotation of the pipe 14 on the joint of the connection duct 15.

[0089] A sheet metal cover 16 fixed by screw was used to cover the hydraulic connection duct 15.

[0090] Preferably, as shown in Figure 8, the connection between the ducts in the fixed body 2 and the duct in the support element 3 takes place in series.

[0091] In use, the hot heat transfer fluid (shown in red or with a solid arrow) enters the inlet opening 17 of the fixed heating body 2 passing only through a delivery duct 18 present in the fixed body 2, and, passing through a first intermediate duct 14, then continues into the connecting duct 15 and feeds the second duct 19 arranged in the support element 3, going through it entirely. Then, the heat transfer fluid flows from the second duct 19 present in the support element 3 through the connection duct 15 arranged at the other end of the support element 3 and, through a second intermediate duct 14, enters the fixed body 2 again entering a first manifold 20, feeding through it a plurality of first ducts or radiating elements 21 and then passing into a second manifold 22 arranged at the opposite ends of the first ducts 21. Between the manifolds 20 and 22 and the first ducts 21 the heat transfer fluid flows in parallel. From the second manifold 22 the heat transfer fluid, now cooled compared to the inlet temperature, flows, through a connection duct 23, towards the return duct 24 from which it exits the radiator through the outlet opening 25 (here the heat transfer fluid is shown with blue arrows or not solid arrows).

[0092] The series circulation between the ducts present in the support element 3 and in the fixed body 2 of the radiator 1 has a forced passage which makes the heating of the product more homogeneous with lower thermal gradients, improves its deaeration and makes the circulation of the heat transfer fluid more effective and efficient.

[0093] The hydraulic scheme applied to the radiator in Figures 5 - 7 is shown in Figure 8. However, it can also be applied to the other illustrated embodiments.

[0094] Referring to Figures 9 and 10, a third variant of the hydraulic system for the radiator 1 according to the invention is observed. The solution is similar to the second variant, but it allows to further improve the aesthetics of the radiator object of the invention. In fact, it allows to eliminate the casing covering the connection and the connection itself which is obtained in a striking portion 26 of the support element 3 or in a separate body 26 solidly coupled, in particular welded, to the support element 3.

[0095] Such striking portion 26 is a monobloc element wherein a connection duct 15, the mobile seat 53 for the pivot 52 and the radial opening 55 for the fastening means 56 are obtained.

[0096] Such striking portion 26 of the support element 3 therefore has a connection duct 15 able to put in fluidic connection the intermediate duct 14 with the duct passing through the support element 3. Furthermore, to improve the seal between the intermediate duct 14 and the connection duct 15 obtained in the striking portion 26, one or more seats 27 are provided, in particular two seats 27, for sealing elements 28, in particular O'ring 28.

[0097] In the third variant, the striking portion advantageously becomes both a component of the kinematic chain that allows the motion of the support element 3, and a component of the connection means.

[0098] Observing Figures 11, 12 and 14, a fourth variant of the means for connecting the radiator 1 according to the invention is shown. Compared to the third variant, the hydraulic seal is entrusted to a linear hydraulic connection 29. This solution has been developed to make the procedure for assembling the product more robust since all mobile components are joined by a threading and no care and attention is required for placing the O-rings in their seat, as required in the third variant.

[0099] In this case a linear connection element 29 is used, in particular for copper pipes, which puts the intermediate duct 14 in fluidic communication with an extension 30 which is in turn screwed at a first end to the linear connection 29, preferably through a sleeve 33, and at a second end to a threaded seat 31 obtained in the striking portion 26.

[0100] In particular, the extension 30 is a portion of rigid pipe, preferably made of steel, which has a linear trend and is fitted into the hollow pivot 52 co-axially to the axis of rotation y of the hinge 5.

[0101] Preferably the threaded seats of the linear connection 29 and of the striking portion 26 of the support element 3 are of the G1/8" type, preferably the extension 30 when it is made of steel can also be brazed to the threaded seat 31 in the striking portion 26.

[0102] Furthermore, to lock the connecting rod 11 in place on the pivot 52, a stop ring 32 can be provided, preferably made of steel, in particular of the Seeger D20 type, which is housed in a seat 58 obtained in correspondence of the timed pin 57 of the pivot 52.

[0103] In the process for obtaining the radiator 1 according to the fourth variant, once the support element 3 has been positioned relative to the fixed body 2, the extensions 30 are coupled into the respective seats 31 of the striking portions 26, also by a possible subsequent brazing, the hollow pivot 52 is inserted coaxially to the extensions 30 and the extensions 30 are hydraulically connected with the intermediate duct 14 through the linear connection 29.

[0104] The described hydraulic connection systems, and in particular the one described for the fourth variant, can also be used with other means for articulating the support element relative to the fixed body and therefore with kinematics other than the connecting rod - linear actuator system described in the present text.

[0105] Advantageously, the radiator according to the invention allows the passage of the heat transfer fluid between the fixed body and the support element, without hindering the mobility of the support element in the different degrees of amplitude.

[0106] This allows the support element to play an active role also in heating. Active since the heat transfer fluid runs through the support element 3 and therefore the latter actively takes part to the heating and/or drying function of the hand towels.

[0107] In the embodiments shown in Figures 1 - 15 of the radiator 1 according to the invention, the support element 3 is preferably obtained by sealing tubular sections. In particular, the two profile vertical arms 8, preferably of 50 x 20 mm, are welded with the horizontal arm 9, preferably of 100 x 20 mm, to obtain the "U" shape.

[0108] However, such proceeding method, even if cheap and fast, can have drawbacks, such as a reduced maximum operating pressure of the radiator and a high surface temperature reached by the support element 3. Therefore, such high temperature makes it unpleasant for the user to move the support element 3.

[0109] In particular, this is due to the fact that in such solution the heat transfer fluid flows in the entire volume of the support element 3, thus resulting in high surface temperatures of the support element 3, similar to the temperatures of the fixed body 2 of the radiator 1.

[0110] In fact, the radiator 1 according to the invention, thanks to its operating efficiency, being able to reach even 70° - 75° C, can make the contact and therefore the motion of the support element 3 uncomfortable for the user when it reaches such temperatures.

[0111] Furthermore, a further drawback of using long tubulars or profiles, for example 50 mm or 100 mm long, if stressed with operating pressures typical of the heated towel rail radiators 1 (generally an operating pressure greater than 5 Bar), they can be deformed, reducing the aesthetic impact of the radiator 1.

[0112] To solve such issues, a second variant of the support element 3 of the radiator 1 according to the invention was developed, shown in Figures 16a - 16b and 17a - 17b.

[0113] The elements in common with the radiator 1 according to the embodiment previously described will be indicated with the same numerical references.

[0114] The support element 3 in the second variant is obtained by joining at least two shaped sheets 34 and 35, in particular in the particular embodiment shown in Figures 16a - 16b and 17a - 17b, a first front shaped sheet 34 and two

rear shaped sheets 35.

[0115] Such sheets 34 and 35 are shaped in such a way as to follow the shaped profile of the support element 3, in particular the "U" profile. Such sheets 34 and 35 are easy to shape and being particularly thin, they are rather light.

[0116] The second duct 19 is housed inside said shaped sheets 34 and 35 in fluidic connection with the two striking portions 26 of the connection system, arranged at the two free ends of the vertical arms 8 of the support element 3 and adapted to be in fluidic connection with the ducts arranged in the fixed body 2 wherein the heat transfer fluid flows.

[0117] Preferably, also such second duct 19 is bent in such a way as to have a "U" shape so as to follow the profile of the support element 3.

[0118] The second duct 19 is fixed to the front sheet 34, or to the rear sheets, by means of a plurality of shaped fins 36 adapted to lock the second duct 19 in place and at the same time acting as thermal bridges between the second duct 19 inside which the heat transfer fluid is running through and the sheets 34 and 35 helping to increase the heat exchange between such components. Said shaped fins 36 are preferably welded to a sheet 34 or 35, in particular to the front sheet 34.

[0119] Furthermore, each shaped fin 36 has two flat portions 37, having a width substantially equivalent to the thickness of the support element 3 in such a way as to have the sides in contact with said sheets 34 and 35, and has a connection band 38 between said flat portions 37 to form a cavity for the passage of the second duct 19.

[0120] Thanks to such configuration of the support element 3, advantageously there is no impact on the operating pressure of the radiator, since the second duct 19 has standard dimensions, equivalent to the other ducts of the fixed body 2.

[0121] Furthermore, thanks to such configuration of the support element 3 it does not have the same temperature as the fixed body 2.

[0122] In fact, with the described solution of the support element 3, the heat transfer fluid insists only inside a pipe having a circular section 9 which is more highly performing in terms of resistance to pressures, while regarding the surface temperatures the lower content of heat transfer fluid together with an indirect and degraded heat transfer between the second duct 19, the shaped portions 36 and the sheets 34 and 35 make them always adapted to dry/heat the hand towels without however exceeding the maximum values even when the delivery temperatures are high, obviously without compromising the temperatures that can be reached in the fixed body 2 of the radiator 1.

[0123] As an alternative to the described embodiment of the radiator 1 according to the invention, in replacement of the described hydraulic heating system, which provides the flow of a heated heat transfer fluid inside hydraulic ducts passing both through the fixed body 2 of the radiator 1 and through the support element 3, an electric-powered thermal heating can be provided.

[0124] An example of such third embodiment of the radiator according to the invention is shown in Figures 18a - 18b, 19 and 20.

[0125] Such solution does not differ in the kinematics and in the structural configuration from the previously described embodiments of the radiator 1 according to the invention, except for the replacement of the hydraulic ducts with a radiant system with thermal resistances 41 made of a heating wire arranged in the fixed body 2 and also passing through the support element 3.

[0126] Such system of thermal resistances is connected to a power unit 42, preferably arranged in the fixed body 2, and controlled by a control unit, in particular a chronothermostat, preferably a radio frequency chronothermostat.

[0127] In embodiments not shown and described, the radiator could be of the mixed type and provide both electric and hydraulic heating means.

[0128] In the foregoing, the preferred embodiments have been described and variants of the present invention have been suggested, but it is to be understood that those skilled in the art will be able to make modifications and changes without thereby departing from the relative scope of protection, as defined by the attached claims.

Claims

1. Heated towel rail radiator (1) comprising a fixed body (2) and at least one support element (3) for hand towels, said at least one support element (3) being constrained in rotation to said fixed body (2) by means of at least one hinge (5) on which articulation means (7) are acting which are configured in such a way as to act on said support element (3) to make it rotate along an axis of rotation (y) relative to said fixed body (2) between a closed position and at least one open position, wherein it is rotated by an angle greater than and not equal to 0°, preferably up to 45°, said radiator (1) being **characterised in that** said articulation means (7) comprise a connecting rod (11), associated with said hinge (5) by means of a timed coupling, and a linear actuator (12) acting on said connecting rod (11) and constrained to said fixed body (2).

2. Radiator (1) according to the preceding claim, **characterised in that** said linear actuator is a pneumatic cylinder (12), in particular a gas spring (12).

3. Radiator (1) according to claim 1 or 2, **characterised in that** said linear actuator (12) and said connecting rod (11) are configured in such a way that both when said support element (3) is in said open position or in said closed position, the linear actuator (12) exerts a thrust force (Fs) greater than the force exerted on said connecting rod (11) by the weight of said support element (3).

4. Radiator (1) according to any one of claims 1 - 3, **characterised in that** the connecting rod (11) has a first fixed end (111) constrained in rotation with said hinge (5), and a second end (112), opposite to the first end (111), **in that** said linear actuator (12) has a first end (121), constrained in rotation to said second end (112) of said connecting rod (11), and a second fixed end (122) constrained in rotation with said fixed body (2) of the radiator (1), **in that** when said support element (3) is in said closed position the first axis (t) passing through the ends (111, 112) of said connecting rod (11) is oriented by a first angle (α) lower than 0°, preferably up to -10°, in particular equivalent to -5°, relative to a second fixed axis (s) passing through the fixed ends (111, 122) of said connecting rod (11) and of said linear actuator (12) and **in that** when said support element (3) is in said open position, said first angle (α) is greater than 0°, preferably between 15° and 45°, preferably equivalent to 20°.

5. Radiator (1) according to any one of the preceding claims, **characterised in that** said connecting rod (11) has a timed seat (113) and **in that** said hinge (5) has a pivot (52) having a timed pin (57) shaped in such a way as to couple and fit firmly into said timed seat (113) of the connecting rod (11).

6. Radiator (1) according to claims 4 and 5, **characterised in that** said timed seat (113) of said connecting rod (11) comprises at least one indentation (114) having an axis of symmetry (s'), said axis of symmetry (s') being oriented relative to said first axis (t) of the connecting rod (11) by a fixed angle (α'), equivalent to said first angle (α) when said support element (3) is in said closed position, preferably equivalent to -5°.

7. Radiator (1) according to any one of the preceding claims, **characterised in that** given the following parameters:

LB [mm] = distance between the ends (111, 112) of the connecting rod (11);
H [mm] = height of the support element (3);
F_s [N] = thrust force of the linear actuator (12);
α = said first angle (α);
P [kg] = weight of the support element (3);
k = safety coefficient = 1,3
D_1f (H;α) = arm of the load acting on said support element (3);
D_2f (LB;α) = arm of the linear actuator (12);
the relationship between them is indicated by the following formula:

$$2 \cdot F_s \cdot D_2 f(LB; \alpha) = P \cdot D_1 f(H; \alpha) \cdot k$$

8. Radiator (1) according to any one of the preceding claims, **characterised in that** said hinge (5) has a fixed seat (51) integral with the fixed body (2) of the radiator (1), a mobile seat (53) integral with the support element (3) and a pivot (52) fitted into both seats (51, 53) coaxially to the axis of rotation (y) of the hinge (5) and coupled integrally to the mobile seat (53) of the support element (3) in such a way that when the support element (3) passes from said closed position to said open position, and vice versa, said pivot (52) rotates on said axis of rotation (y) relative to the fixed seat (51) of the fixed body (2).

9. Radiator (1) according to any one of the preceding claims, **characterised in that** it comprises first heating means housed in said fixed body (2), preferably second heating means are housed in said support element (3) and are connected to said first heating means by connection means.

10. Radiator (1) according to the previous claim, **characterised in that** said hinge (5) has a hollow pivot (52) along the axis of rotation (y) and **in that** first heating means are provided in said fixed body (2) and second heating means in said support element (3) and connection means (14, 30) between said first and second heating means passing through said hollow pivot (52).

11. Radiator (1) according to claim 9 or 10, **characterised in that** said first heating means, and possibly said second connection means, are hydraulic ducts in fluidic connection to each other for the passage of a heated heat transfer fluid.

12. Radiator (1) according to claims 10 and 11, **characterised in that** it comprises a plurality of first ducts (21) arranged in said fixed body (2), at least one second duct (19) arranged in said support element (3) and an intermediate duct (14; 14, 30) for the passage of the heat transfer fluid between said first ducts (21) and said at least one second duct (19), said intermediate duct (14; 14, 30) passing through said hollow pivot (52) and a connection duct (13; 15) between said intermediate duct (14; 14, 30) and said second duct (19).

13. Radiator (1) according to the preceding claim, **characterised in that** said connection duct (15) is an elbow fitting or is a flexible pipe (13) arranged in the rear face of said radiator (1).

14. Radiator (1) according to claim 12 or 13, **characterised in that** said connection duct (15) is formed in a striking portion (26) of the support element (3) or in a solidly coupled separated body (26), in particular welded, to the support element (3).

15. Radiator (1) according to the preceding claim, **characterised in that** said intermediate duct comprises a first portion (14), arranged in said fixed body (20), and a second connection portion (30) passing through said hollow pivot (52) and having threaded ends, **in that** it provides a linear hydraulic connection (29) in fluidic communication and straddling said first portion (14) of the intermediate duct and the first end of said second connection portion (30) of the intermediate duct, to which it is screwed, and **in that** the second end of said second connection portion (30) is screwed onto a threaded seat (31) obtained in said striking portion (26).

16. Radiator (1) according to any one of claims 11 - 15, **characterised in that** said support element (3) is formed by shaped sheets (34, 25) having a thin thickness, inside which the at least second duct (19) is housed and fixed to them by means of a plurality of shaped fins (36) adapted to lock the duct (19) in place and at the same time acting as thermal bridges between the second duct (19) and the sheets (34, 35).

17. Radiator (1) according to any one of claims 11 - 16, **characterised in that** the fluidic connection between the plurality of first ducts (21) arranged in the fixed body (2) and the at least one second duct (19) arranged in the support element (3) takes place in series.

18. Radiator (1) according to any one of claims 11 - 17, **characterised in that** it comprises a delivery duct (18) arranged in the fixed body (2) for entering the heated heat transfer fluid and in fluidic connection with the at least one second duct (19) arranged in said support element (3) through at least one intermediate duct (14; 14, 30), said second duct (19) being in fluidic communication with the plurality of first ducts (21) arranged in said fixed body (2) through a delivery manifold (20), said second ducts (2) being in fluidic communication with an outlet manifold (22) in turn in fluidic connection with the return duct (24) for exiting the heat transfer fluid from the radiator (1).

19. Radiator (1) according to the preceding claim, **characterised in that** said plurality of second ducts (21) are in fluidic connection with each other in parallel through said delivery (20) and outlet (22) manifolds.

20. Radiator (1) according to any one of claims 9 or 10, **characterised in that** said heating means are a radiant system with thermal resistances (41) connected to a power unit (42), preferably arranged in the fixed body (2), and controlled by a control unit, in particular a chronothermostat, preferably a radio frequency chronothermostat.

21. Radiator (1) according to any one of the preceding claims, **characterised in that** said support element (3) has a substantially "U" shape having two first arms or vertical arms (8) and a second arm or horizontal arm (9), substantially perpendicular to the first arms (8), wherein the two first arms or vertical arms (8) have an end constrained in rotation to said fixed body (2) on the respective hinge (5).

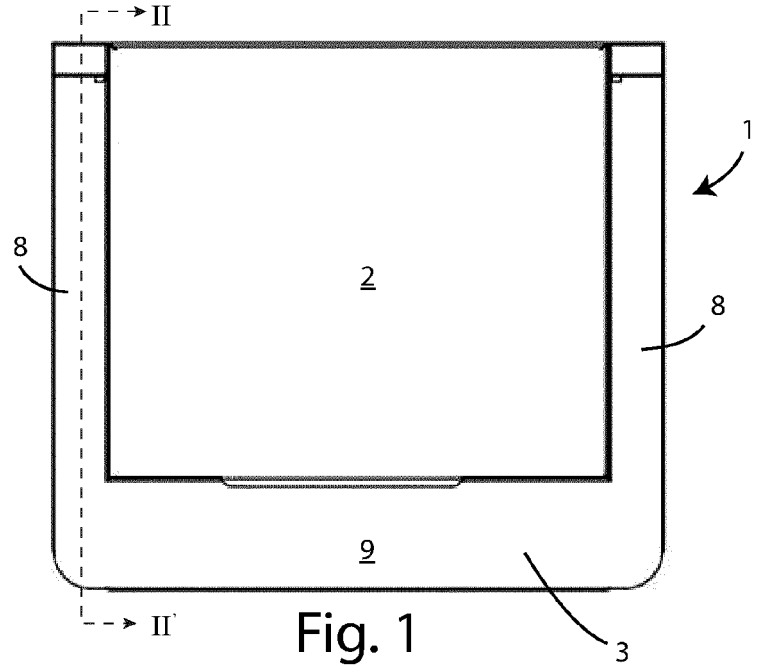

Fig. 1

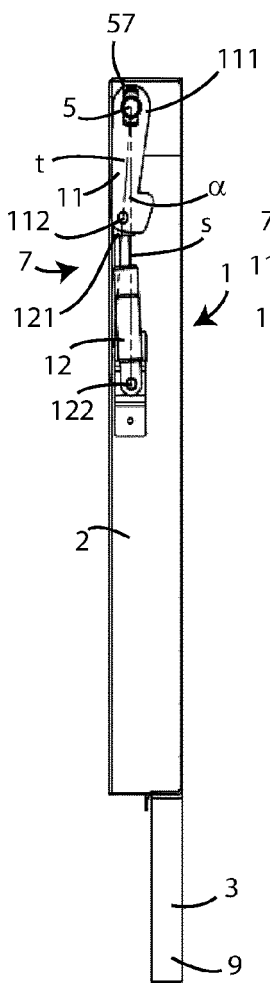

Fig. 2a

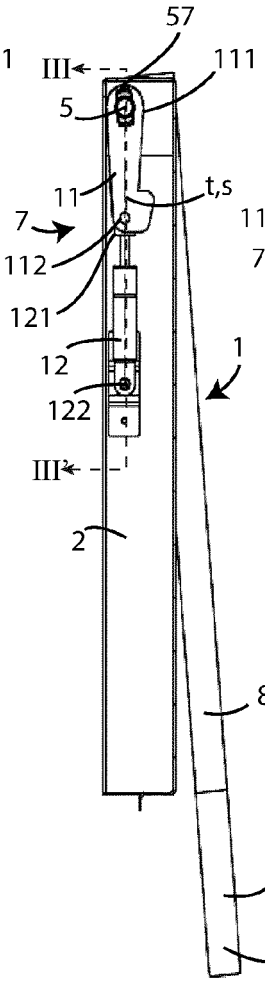

Fig. 2b

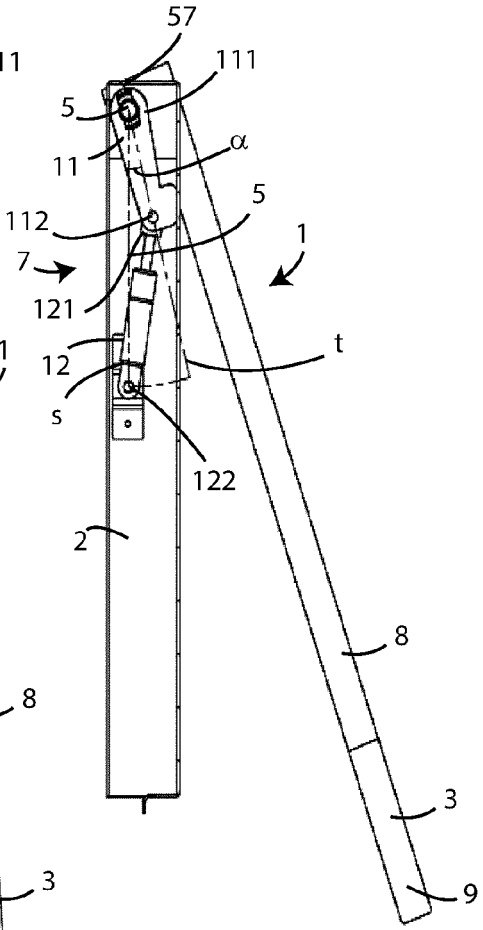

Fig. 2c

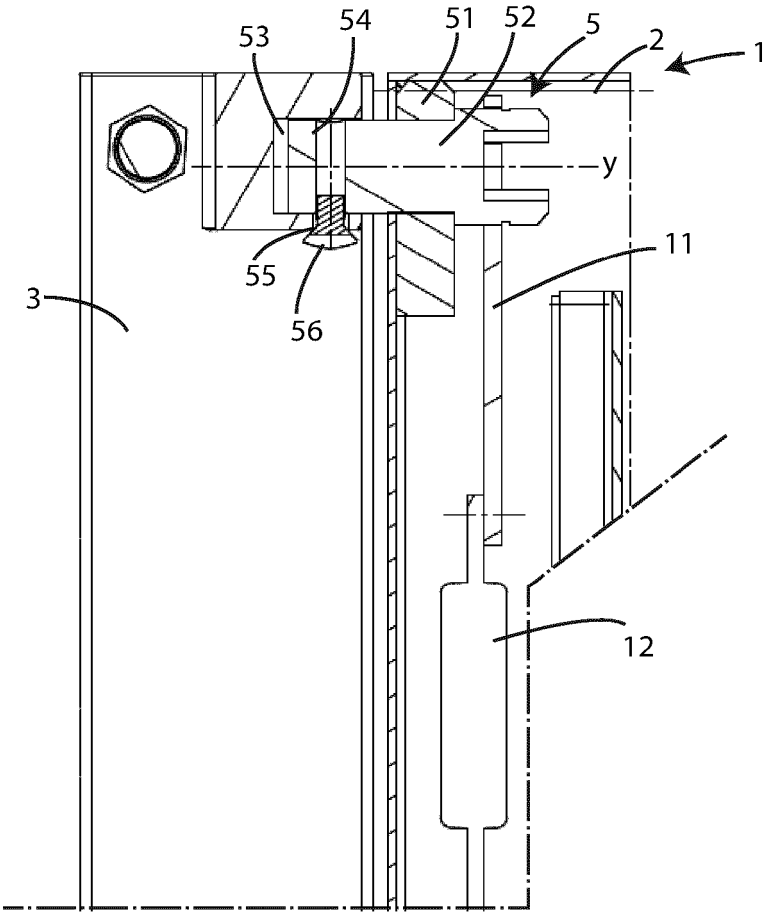

Fig. 3

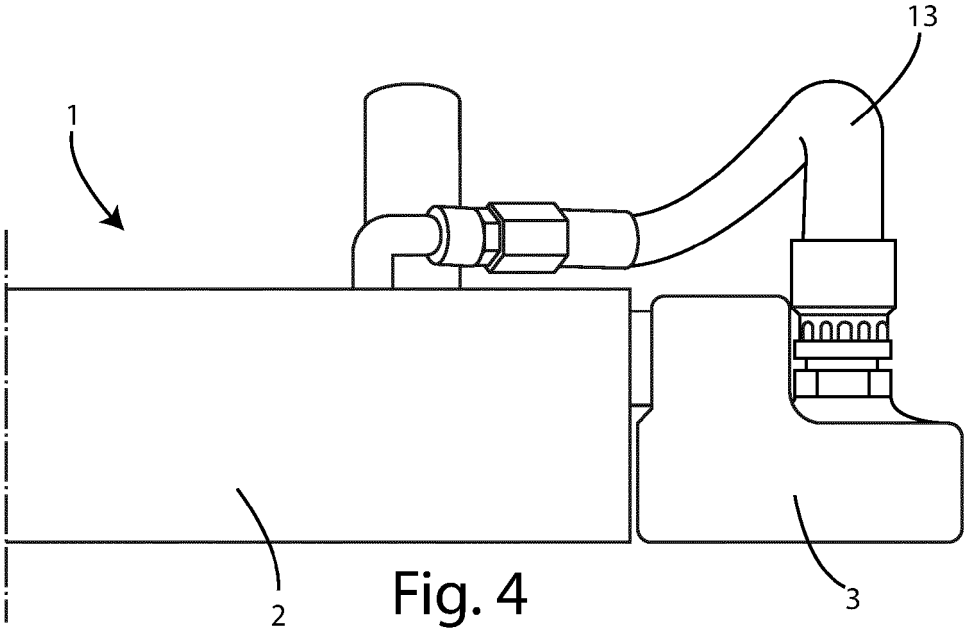

Fig. 4

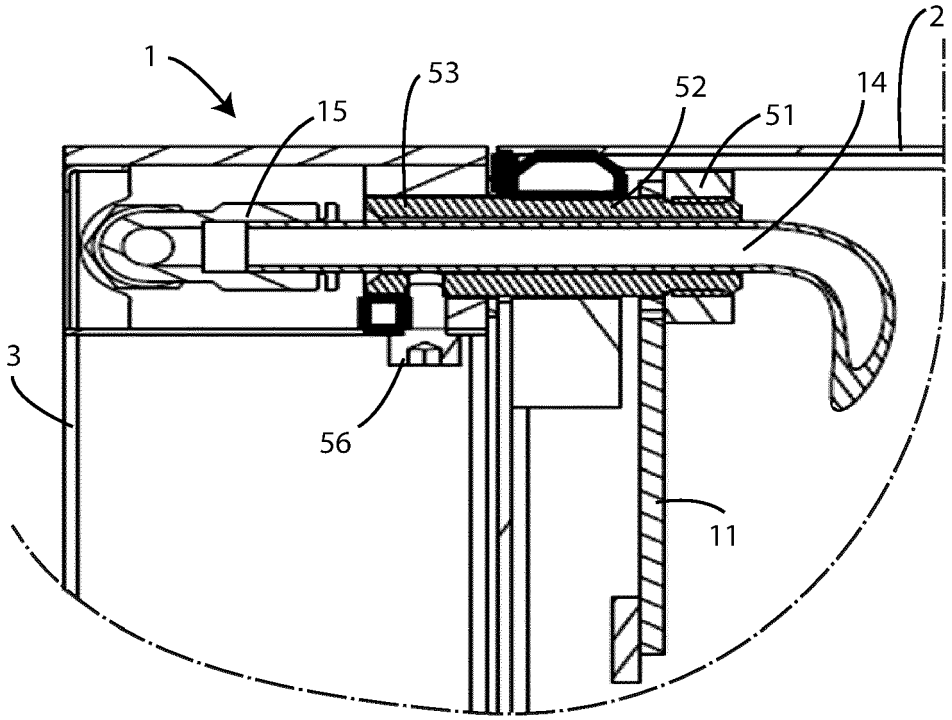

Fig. 5

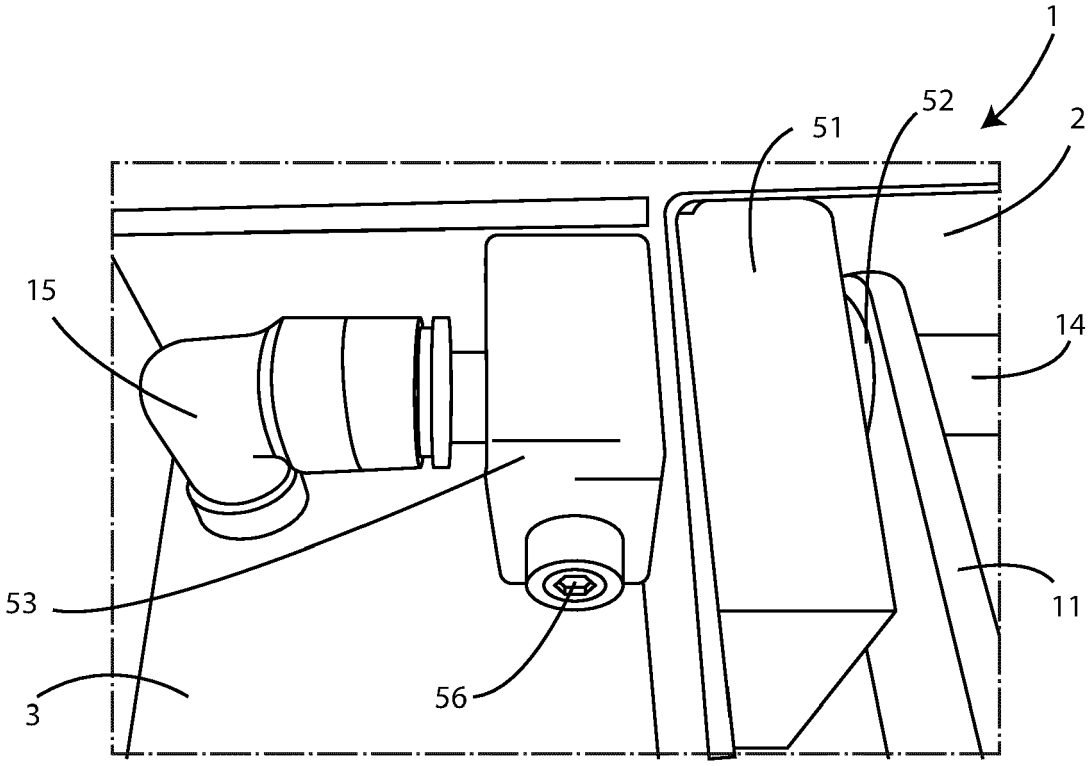

Fig. 6

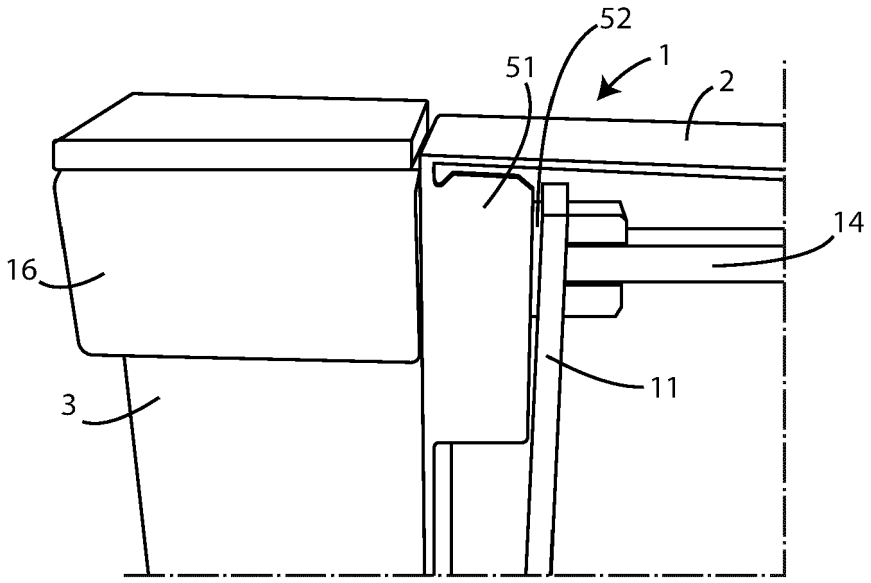
52
51
1
2
14
16
11
3

Fig. 7

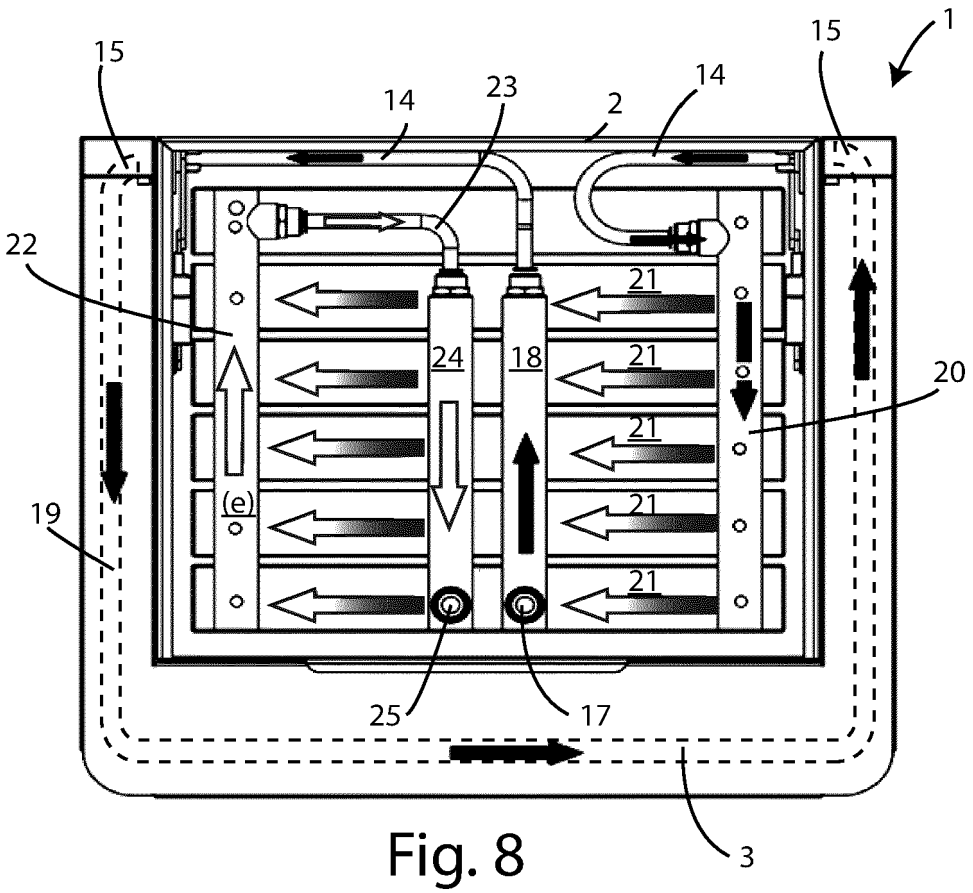
15
1
15
14
23
14
2
22
21
24
18
21
20
21
(e)
21
19
21
25
17
3

Fig. 8

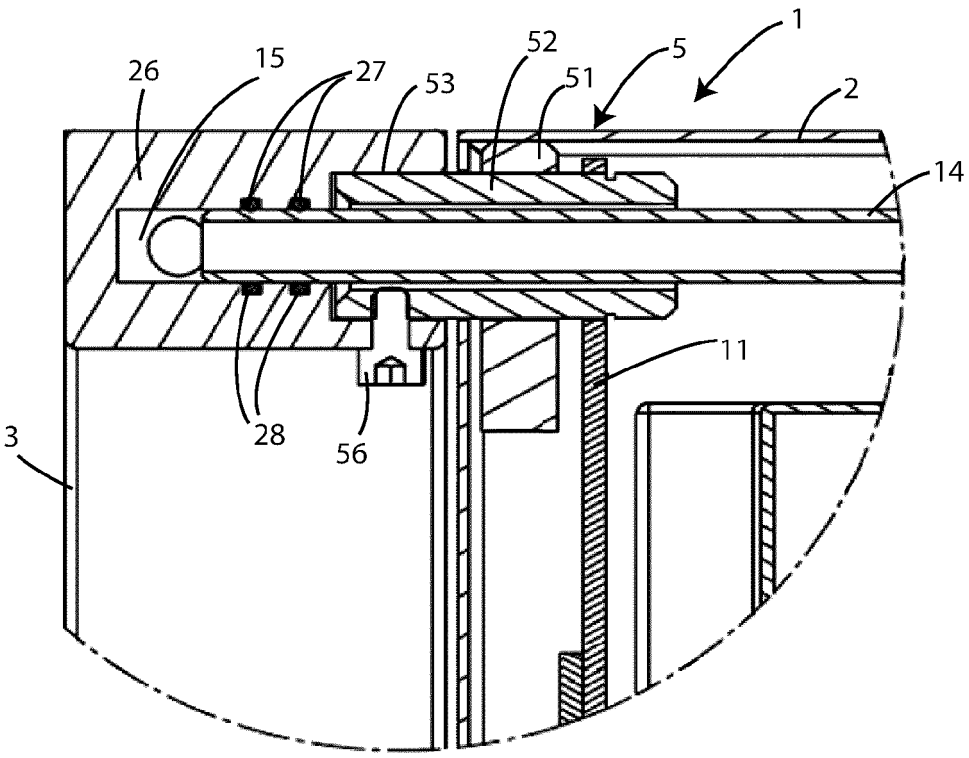

Fig. 9

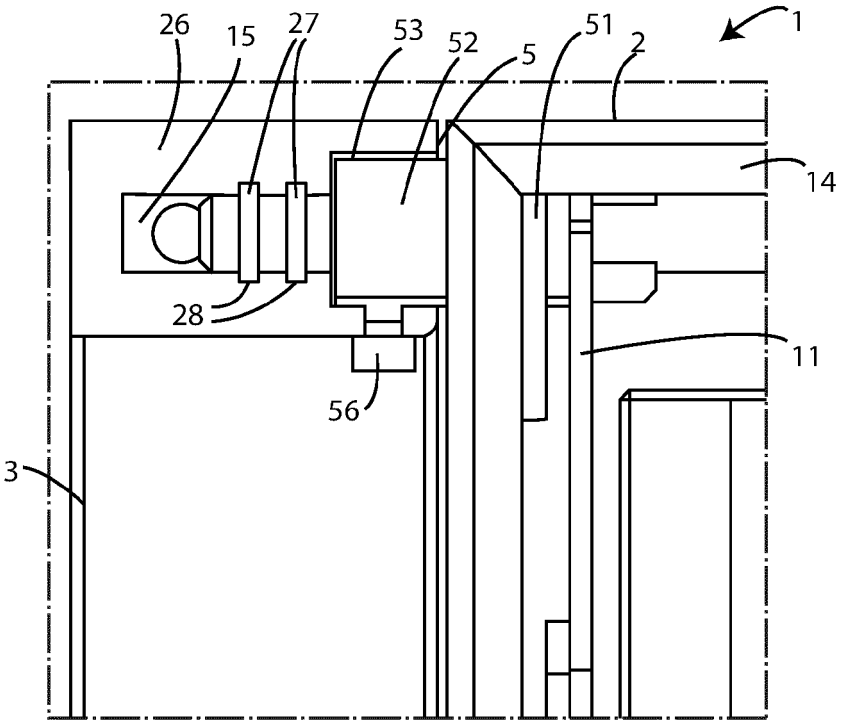

Fig. 10

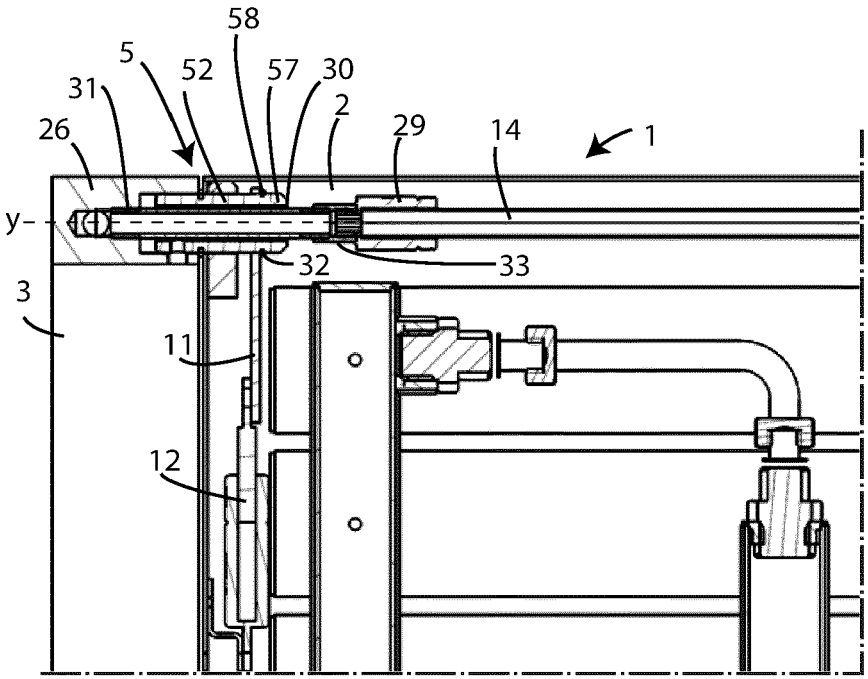

Fig. 11

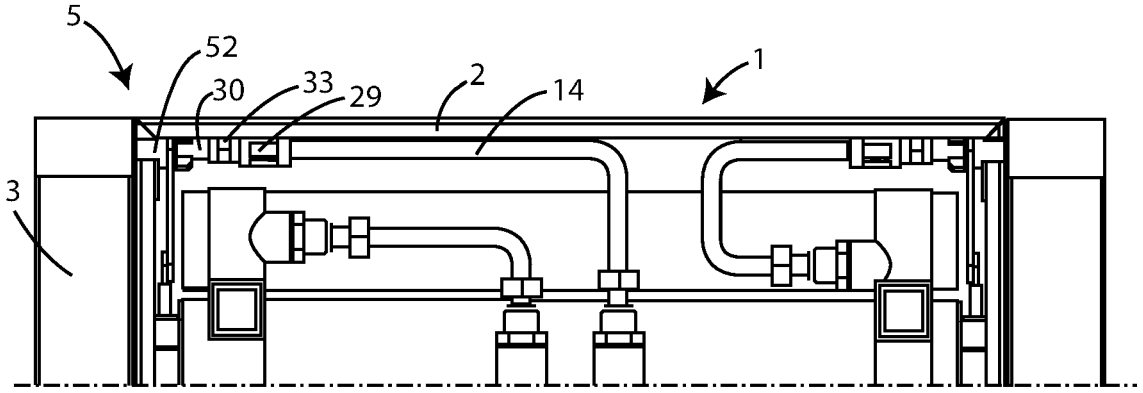

Fig. 12

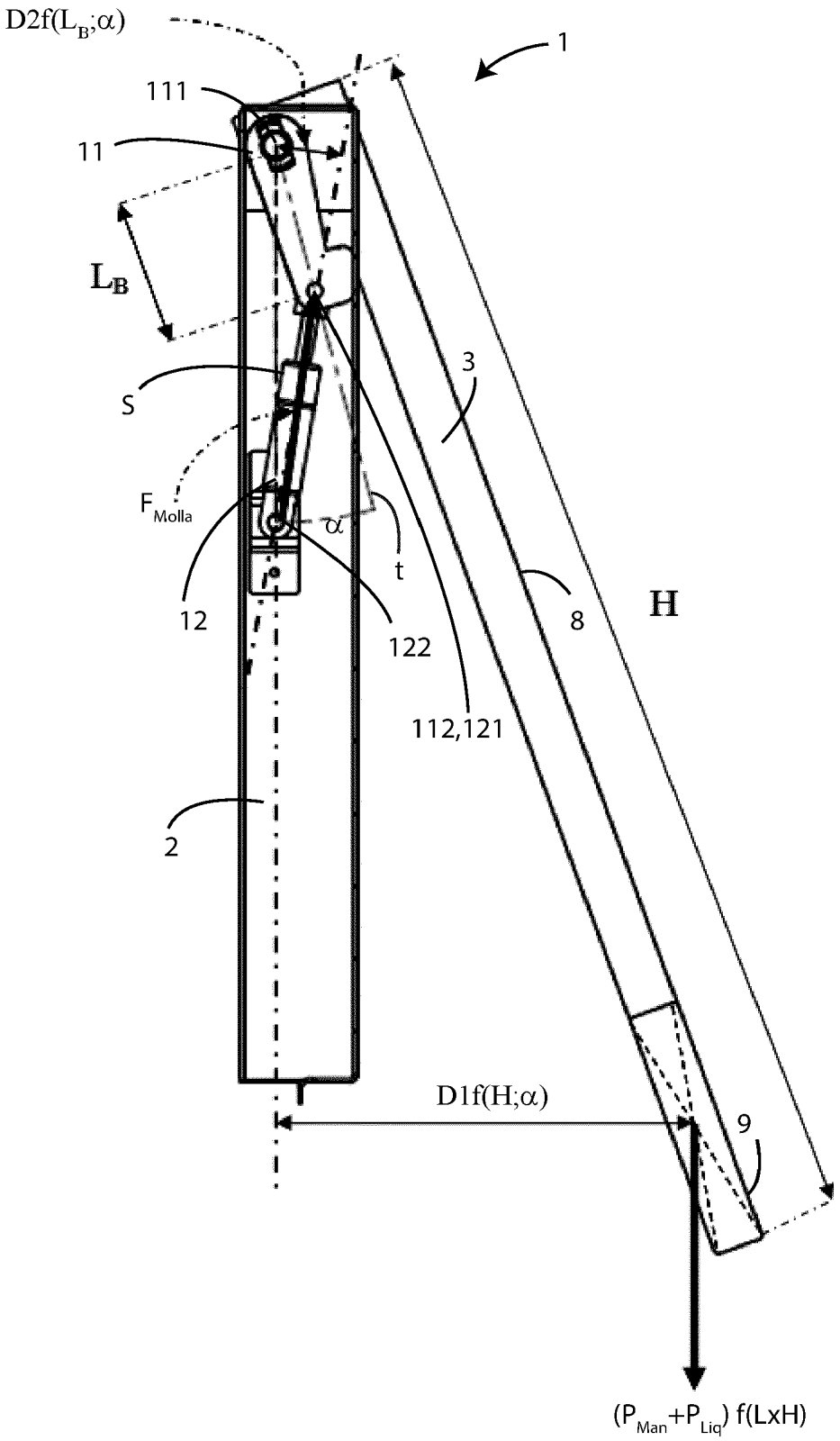
D2f(L_B;α)
1
111
11
L_B
3
S
F_Molla
α
t
12
122
8
H
112,121
2
D1f(H;α)
9
(P_Man+P_Liq) f(LxH)

Fig. 13

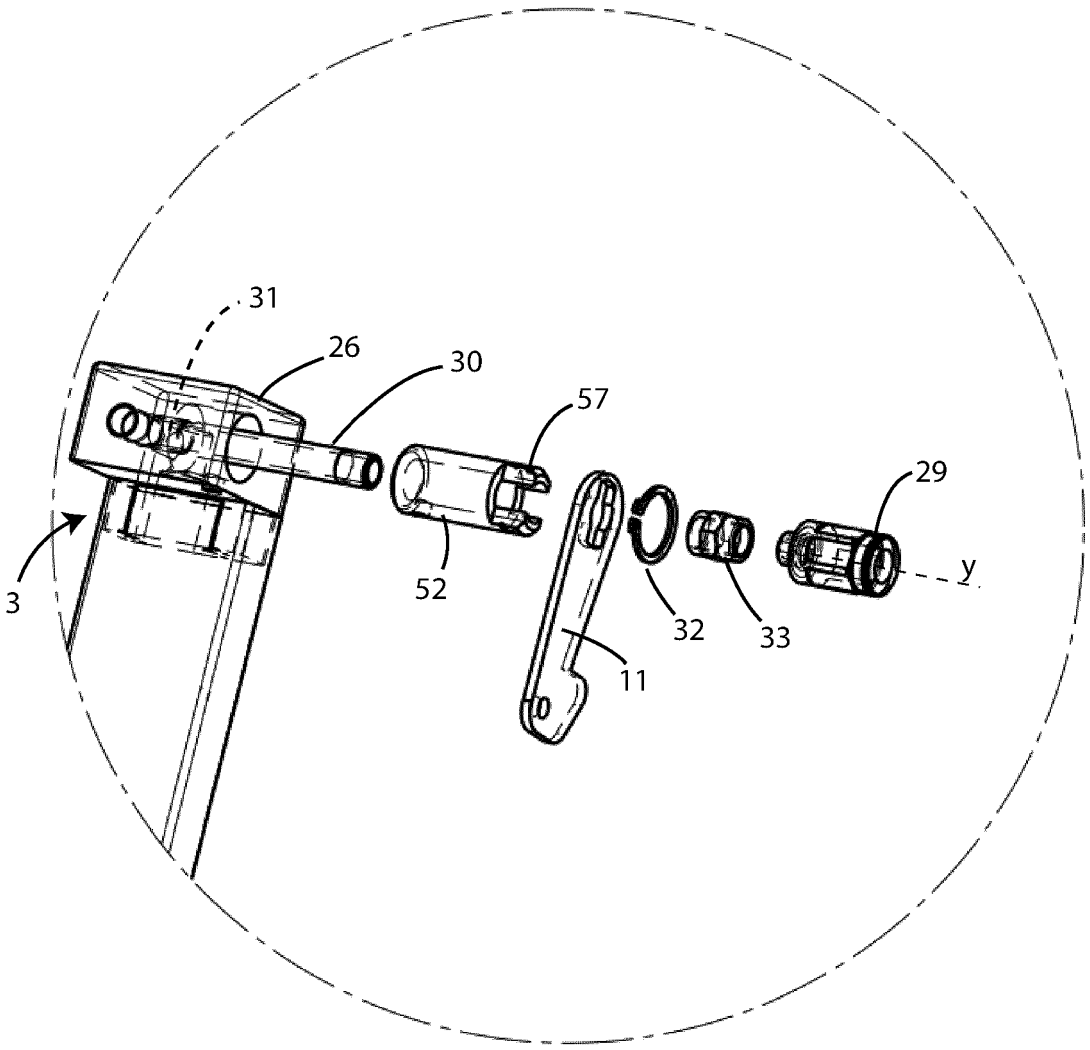

Fig. 14

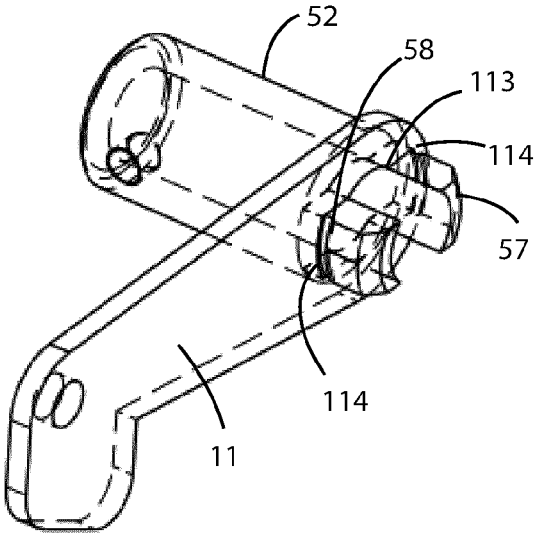

Fig. 15a

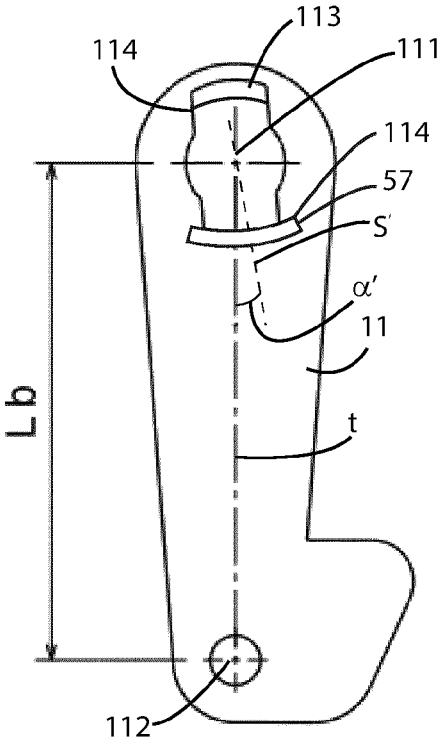

Fig. 15b

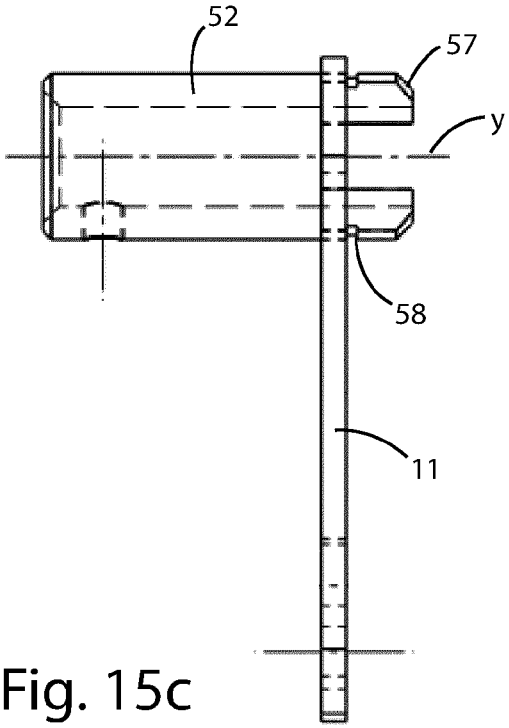

Fig. 15c

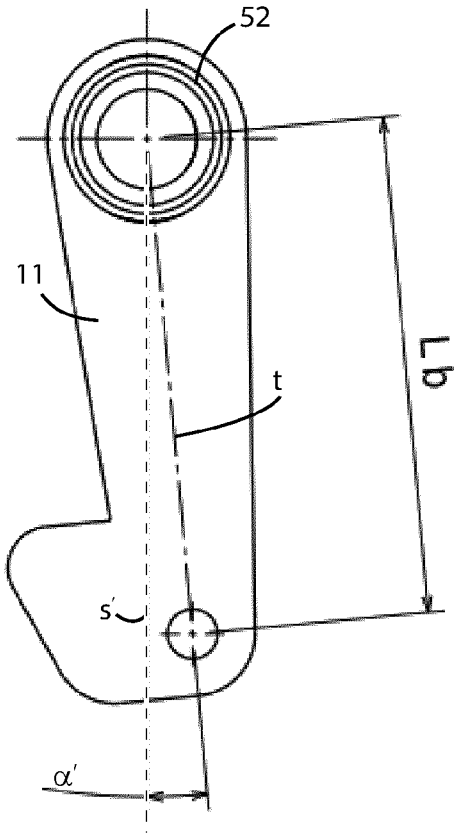

Fig. 15d

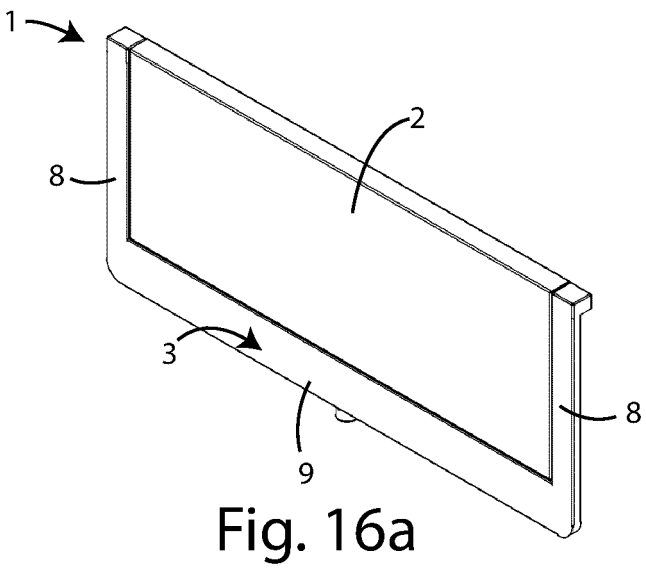

Fig. 16a

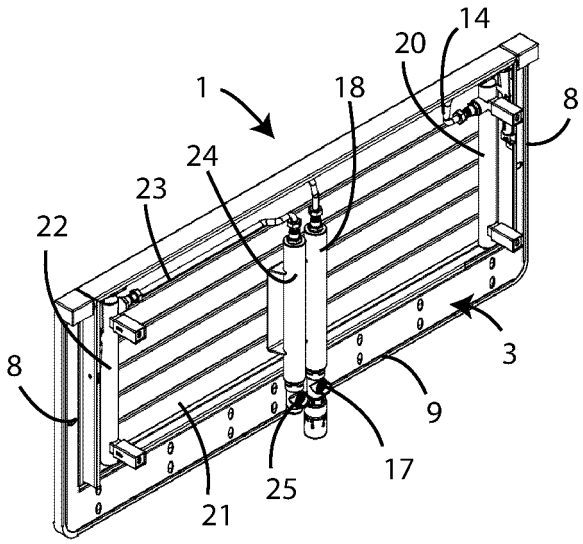

Fig. 16b

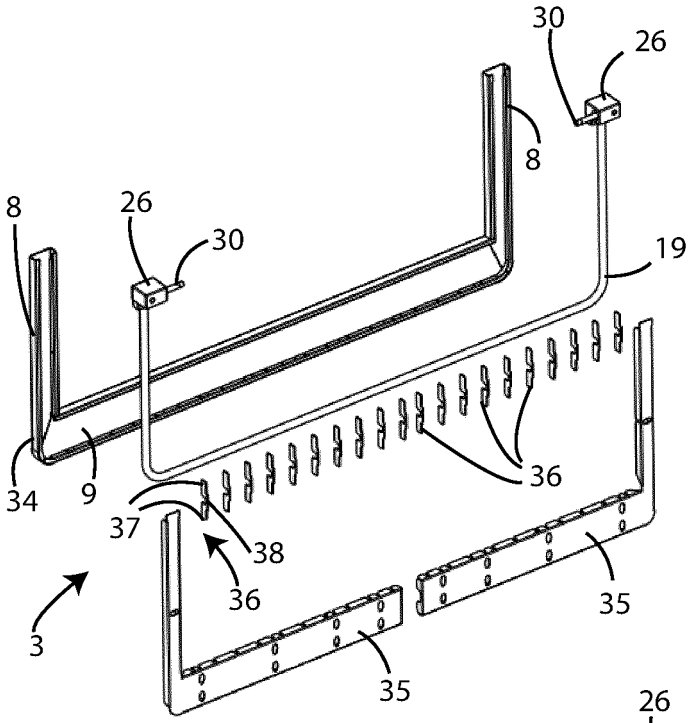

Fig. 17a

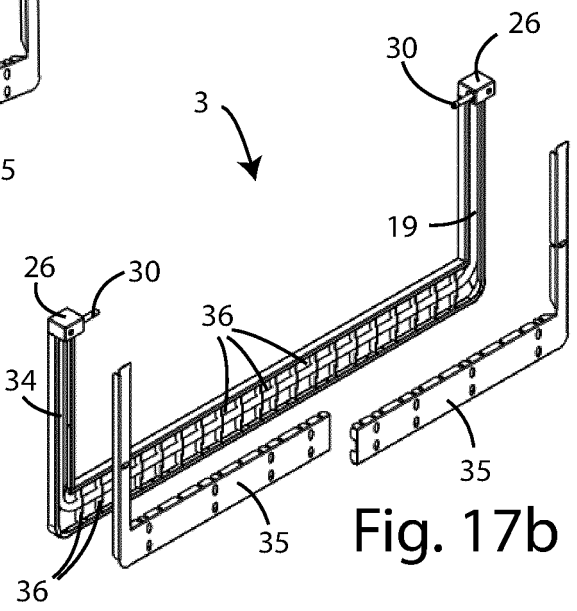

Fig. 17b

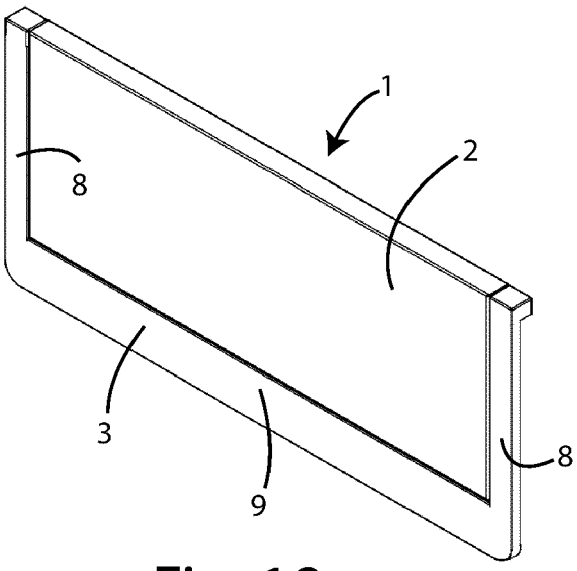

Fig. 18a

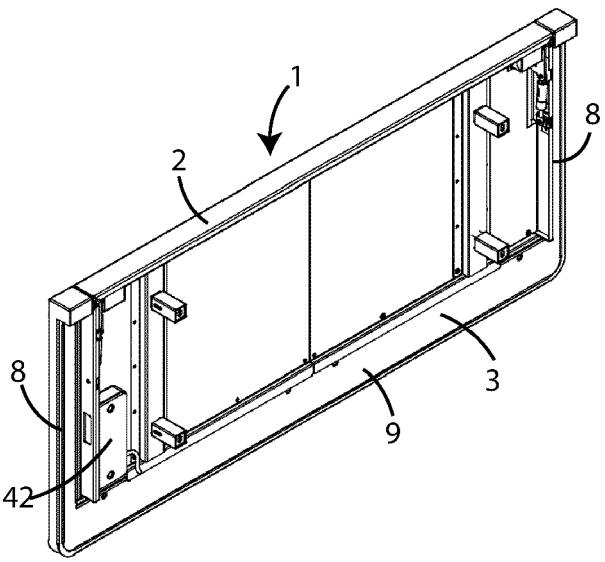

Fig. 18b

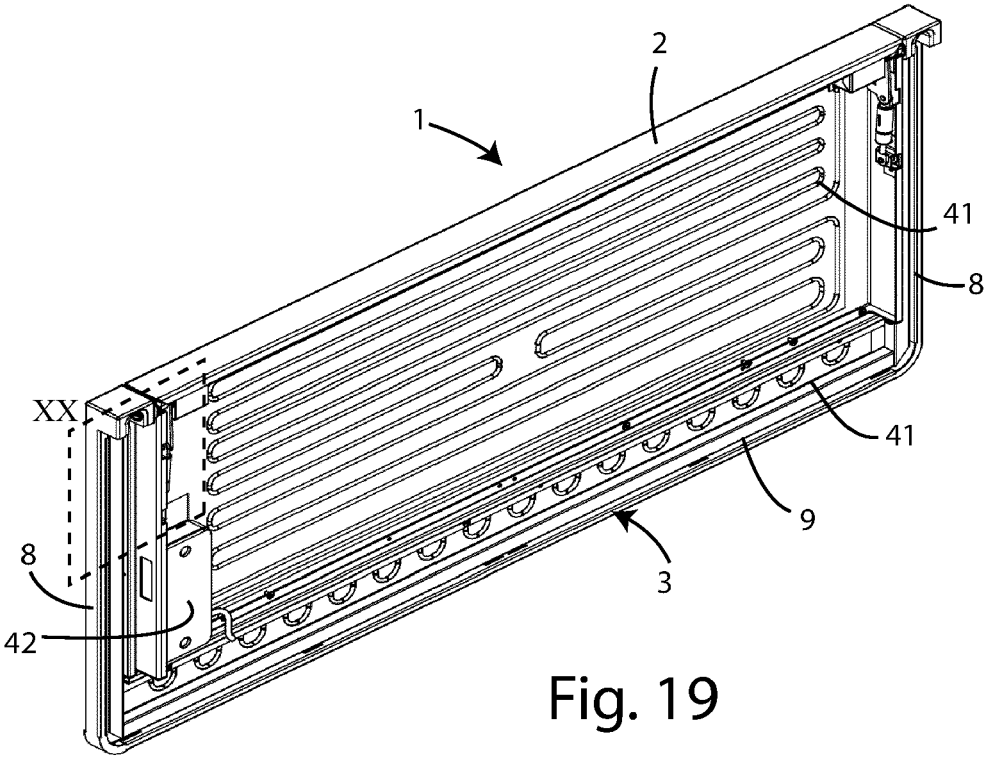

Fig. 19

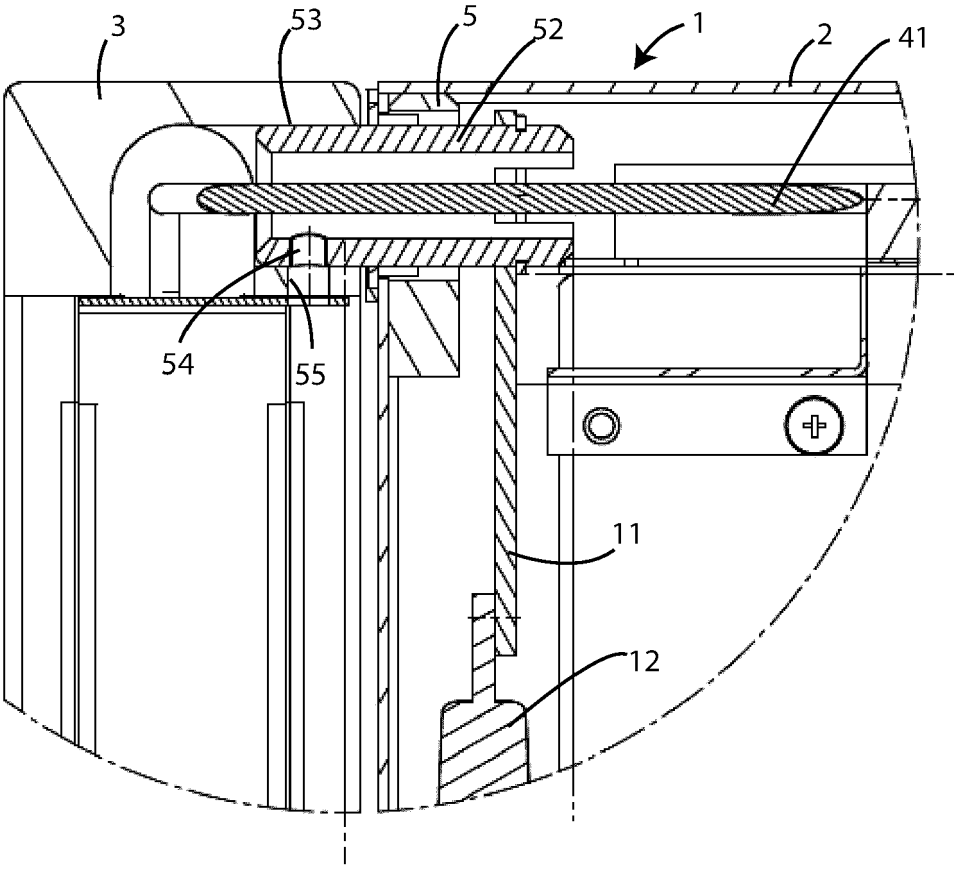

Fig. 20

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 18 2518

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2017/068075 A1 (WILLIAMS TONY [IE]; PORTER IOMAR [GB]) 27 April 2017 (2017-04-27) * page 8, line 13 - page 12, line 24; figures 1-5 *	1-5, 7-15, 17-20	INV. F28D1/053 A47K10/06 F24D19/00 E05F1/12
Y	EP 2 078 811 A2 (BALDACCI S P A [IT]) 15 July 2009 (2009-07-15)	1-4, 7-15, 17-21	
A	* the whole document *	6	
Y	US 2009/302630 A1 (DUFFY MICHAEL [CA] ET AL) 10 December 2009 (2009-12-10)	5	
A	* abstract; figures 1A-6B * * paragraphs [0017] - [0019] *	1-4,6-9, 21	
A	US 2010/127606 A1 (COLLENE JAMES J [US] ET AL) 27 May 2010 (2010-05-27) * paragraphs [0002] - [0004], [0037] - [0039], [0043]; figures 1A, 3A, 3B, 5A-C *	1-9,21	
			TECHNICAL FIELDS SEARCHED (IPC)
Y	EP 1 211 472 A2 (DELTACALOR S R L [IT]) 5 June 2002 (2002-06-05)	10-15, 17-20	E05G E05F
A	* paragraphs [0005] - [0013]; figures 1-8 *	1,9	F28D F28F A47K
Y,D	IT 2018 0000 3428 U1 (CORDIVARI SRL [IT]) 24 March 2020 (2020-03-24)	21	F24D D06F
A	* claims 1-12; figures 1-8 *	1	F16F F16C
A	EP 2 423 606 A2 (KYNE GERRY [IE]; DURCAN MICHAEL [IE]) 29 February 2012 (2012-02-29) * paragraphs [0071], [0072]; figures 13-18 *	1-9	E05D

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 October 2022	Leclaire, Thomas

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 18 2518

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 921 796 A1 (DELTACALOR S R L [IT]) 23 September 2015 (2015-09-23) * paragraphs [0009] - [0012]; figure 1 *	1,9-20	
A	GB 2 523 745 A (KHAN NAZBIN [GB]) 9 September 2015 (2015-09-09) * figures 1A, 1B, 6A-C *	1,21	
A	EP 0 187 878 A1 (ZEHNDER AG GEB [CH]) 23 July 1986 (1986-07-23) * figures 1-3 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 October 2022	Leclaire, Thomas

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 18 2518

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-10-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2017068075 A1	27-04-2017	NONE	
EP 2078811 A2	15-07-2009	NONE	
US 2009302630 A1	10-12-2009	NONE	
US 2010127606 A1	27-05-2010	NONE	
EP 1211472 A2	05-06-2002	AT 291213 T	15-04-2005
		DE 60109394 T2	01-09-2005
		EP 1211472 A2	05-06-2002
		ES 2234743 T3	01-07-2005
		IT MI20000676 U1	01-06-2002
IT 201800003428 U1	24-03-2020	NONE	
EP 2423606 A2	29-02-2012	NONE	
EP 2921796 A1	23-09-2015	EP 2921796 A1	23-09-2015
		ES 2627774 T3	31-07-2017
		IT MI20140107 U1	19-09-2015
GB 2523745 A	09-09-2015	GB 2523745 A	09-09-2015
		GB 2538919 A	30-11-2016
		WO 2015132723 A1	11-09-2015
EP 0187878 A1	23-07-1986	AT 36360 T	15-08-1988
		EP 0187878 A1	23-07-1986

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 2018000003428 U **[0006]**