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(71) Applicant: **ARISTON S.P.A.**
60044 Fabriano (AN) (IT)

(72) Inventors:
- **ANTONELLI, Daniele**
  60026 Numana (AN) (IT)
- **GARBETTI, Gian Marco**
  63067 Cossignano (AP) (IT)
- **GIORGETTI, Alessio**
  60021 Camerano (AN) (IT)
- **SAMPAOLESI, Marco**
  62017 Porto Recanati (MC) (IT)

(74) Representative: **Premru, Rok**
Mar.Bre S.R.L.,
2, Via San Filippo
60044 Fabriano (IT)

(54) GRIPPING MEANS FOR THE HANDLING OF A WATER HEATER

(57) The object of the present invention is a water heater (WH) equipped with gripping means (1) integrated to the upper cap (4).

Such gripping means (1) comprise:
- a pair of handles (2), each of which is located on top of said upper cap (4) at a distance of 180° to each other and is provided with coupling means (24, 25) with reciprocal coupling means (44) obtained in said upper cap (4);
- a pair of counter-handles (3) each of which is located below said upper cap (4) at a distance of 180° from each other and is provided with coupling means (34) with said reciprocal coupling means (44) obtained in said upper cap (4);
- constraint means (5) for said reciprocal coupling means (24, 25, 34, 44) of said upper cap (4) and of said pair of handles (2) and counter-handles (3).

Said pair of counter-handles (3) is firmly incorporated in said insulating material (F) following transition thereof from the liquid to the solid state.

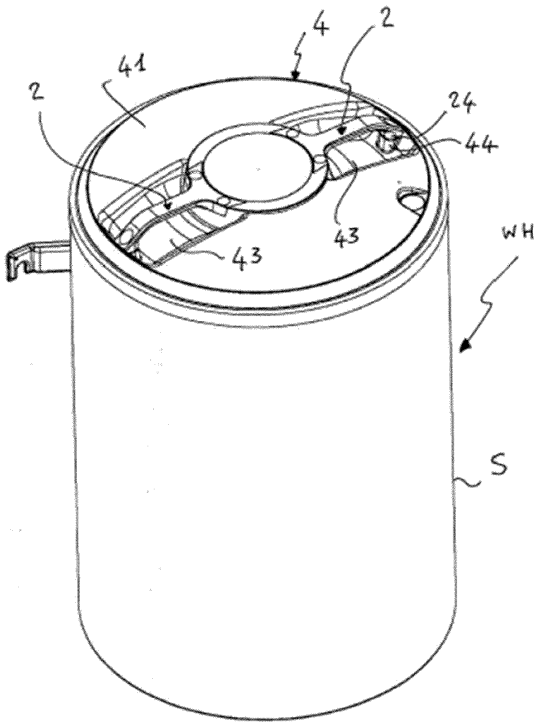

Fig. 1

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Description

[0001] The present invention relates to gripping means integrated with a storage water heater, adapted to facilitate the transport, movement and installation operations thereof.

[0002] The invention finds particular application in the sector of large-sized thermo-sanitary appliances, having a storage tank able to store a large volume of water to be heated: in cases of this kind, the weight and dimensions of the appliance make the transport and installation activities particularly challenging, often forcing the use of more than one installer in order to move the product and place it in the destination environment.

[0003] But, as it will be clear from the following description, the invention is advantageously applicable also to storage water heaters of smaller volumes, facilitating in any case all the operations connected with the handling of the thermo-sanitary appliance.

[0004] Systems are already known in the sector which try to solve the technical problem underlying the transport of thermo-sanitary appliances.

[0005] For example, the prior documents DE19623054, US2021123633 and US20120298681 show devices in the form of large handles, to be temporarily screwed to the threaded connections of the water heater, normally assigned to the engagement of the pipes for the water inlet and outlet: it is, therefore, a solution that may be used as needed, based on the use of additional elements to the product; moreover, their use is bound to the precise position of the threaded connections whereon they engage which, often located both on the bottom and on top of the product, requires the use of more than one person in order to lift and move the water heater.

[0006] An analogous type of gripping means is described in the prior patents US2006055191 and US2008196200, which also describe additional elements to be temporarily associated with and constrained to the water heater.

[0007] Document US2006055191 shows a system consisting of a support belt that supports the product at the bottom, associated with a further belt that wraps around the shell and that at the ends thereof is provided with a pair of gripping handles; document US2008196200 instead provides for a pair of magnetic handles, fixed to the metal shell and secured to the product with the aid of belts passing between said handles: in both cases these gripping systems are laborious to be assembled and of dubious effectiveness in terms of comfort and ease of use.

[0008] Gripping means directly integrated with the water heater are also known, typically comprising pairs of handles laterally recessed in the shell of the water heater: an example of such kind is shown in the prior art document DE20318060, which provides for a double pair of side handles, in the form of recesses dug into the polyurethane insulation of the casing of the water heater. A similar solution is also shown in the prior art document EP3462104, which also describes one or more pairs of gripping recesses, made either on the lower cap or on the back of the casing of the thermo-sanitary appliance.

[0009] The advantage of this solution compared to the other gripping means lies in the integration with the same structure of the water heater, obviating the drawbacks resulting from the use of outer elements to be added to the appliance as necessary: however, even such solution is not free from criticalities, starting from their lateral position and their quantity, that requires the simultaneous presence of at least two installers for a stable and safe handling of the water heater.

[0010] The object of the present invention is to solve the aforementioned drawbacks of the prior art, by providing a water heater provided with gripping means adapted to facilitate the transport, handling and installation thereof.

[0011] Another object is to provide gripping means having greater resistance to the mechanical stresses than the solutions of the prior art.

[0012] Another object of the present invention is to provide a water heater with gripping means through a manufacturing process that does not involve substantial variations or complications in the usual manufacturing process of a standard water heater.

[0013] These and other objects, which shall become clear hereinafter, are achieved with a water heater having gripping means for the handling thereof, in accordance with the provisions of claim 1 for the apparatus and manufactured in accordance with the provisions of claim 10 for the process.

[0014] Other objects may also be achieved through the additional features of the dependent claims.

[0015] The features of the present invention shall be better highlighted by the following description of a preferred embodiment, in accordance with the patent claims and illustrated, purely by way of a non-limiting example, in the annexed drawing tables, wherein:

- Fig. 1 is a perspective view of the water heater equipped with gripping means according to the invention;
- Figure 2 is, in a side section, the water heater of Fig. 1;
- Fig. 3 is an exploded view of the upper cover of the water heater and of the relative gripping means according to the invention;
- Fig. 4 is an assembled view of what shown in Fig. 3, according to a latero-superior perspective;
- Fig. 5 is a latero-inferior view of the upper cover of the water heater of Fig. 4.

[0016] The features of a preferred variant of the invention are now described, using the references contained in the figures. It should be noted that the above figures, although schematic, reproduce the elements of the invention according to proportions among their spatial di-

mensions and orientations that are compatible with a possible executive embodiment.

[0017] It should also be noted that any dimensional and spatial term (such as "lower", "upper", "inner", "outer", "front", "rear" and the like) refers to the positions of the elements as shown in the annexed figures, without any limiting intent relative to the possible operating positions.

[0018] With reference to Figs 1 and 2, with WH is shown the whole storage water heater that, as the prior art, consists of at least the following constructive basic components:

- at least one storage tank T (hereinafter "tank T"), typically of cylindrical shape, comprising a shell V and lower CD and upper CU caps;
- one inlet HC of the cold water inflow tube, engaging in said lower cap CD, adapted to the introduction of cold water substantially at the bottom level of such tank T;
- one outlet HO of the hot water outflow tube, still engaging in said lower cap CD and having a lengthwise development such as to substantially reach the dome of such tank T wherefrom the hot water is drawn;
- one flange FL, adapted to close said lower cap CD of the tank T and supporting further elements not shown in figure, such as one or more electrical resistances, thermo-regulation and/or thermo-protection thermostat sheaths, anticorrosion anodes;
- a container casing S (hereinafter abbreviated to "housing S"), adapted to incorporate and protect said tank T, said housing S comprising a cylindrical shell, closed at the top by an upper cap 4 and at the bottom by a lower cap (not shown in figure);
- a layer of insulating material F, with thermal and acoustic insulation features (hereinafter "insulating material F"), typically represented by polyurethane foam injected into the plenum comprised between the outer surface of said tank T and the inner surface of said housing S.

[0019] In accordance with the invention, the water heater WH comprises gripping means 1 consisting of a pair of handles 2, adapted to be integrated in the upper cap 4 through constraint means and opposing counter-elements capable of being incorporated in said insulating material F.

[0020] As it may be seen in the attached figures, each of said two handles 2 is preferably located at a distance of 180° from each other and is arranged above on said upper cap 4 by means that allows a structural and aesthetic integration with the water heater WH.

[0021] According to the preferred variant of the invention, each handle 2 comprises:

- a median portion 21, horizontally elongated according to an axis substantially parallel and coplanar to the plane of said upper cap 4: said median portion 21 represents the gripping section whereon the hand of the user or the lifting means (such as ropes, hooks, winches or similar means) may engage for the handling of the water heater WH;
- a proximal end 23 connected to said median portion 21, ending in the substantially central zone of said upper cap 4: according to the variant shown in figure, said proximal end 23 branches into two lateral sections substantially orthogonal to said median portion 21, but variants with a single section may be provided (which, in fact, results in the extension of said median portion 21);
- a distal end 22, opposite to said proximal end 23, substantially ending in the proximity of the side edge of said upper cap 4: according to the variant shown in figure, said distal end 22 comprises a single section, substantially consisting of the extension of said median portion 21 of the handle 2, but differently shaped variants may be provided (for example having two side branches, similarly to the proximal end 23 of the attached figures).

[0022] On said proximal 23 and distal 22 ends of the handle 2 through holes 25, passing through respective tangs 24 are obtained which project downwards from such same proximal 23 and distal 22 ends.

[0023] Such tangs 24 are adapted to couple and/or insert by interference into special through seats 44, obtained in said upper cap 4, more precisely on the edges of a recess 43 made on the upper surface of such upper cap 4, below each of said handles 2.

[0024] The aforementioned recess 43 has dimensions and depth such as to allow an ergonomic insertion of the user's hand (or of the lifting means, such as ropes, hooks, winches or similar means) under the handle 2; at the same time, the placement of the pair of handles 2 in the respective recesses 43 does not change excessively the overall aesthetic profile of the water heater WH, since the lying plane of said handles 2 is substantially aligned with that of the upper cap 4, i.e. it is substantially coplanar to that of the surface contiguous to said recesses 43 (see Fig. 2).

[0025] The gripping means 1 according to the invention further comprises a pair of opposing elements 3 (hereafter defined with the term "counter-handles 3"), located below the upper cap 4 and adapted to mutually constrain with the overlying handles 2.

[0026] Consequently, also said counter-handles 3 are preferably arranged at a distance of 180° from each other, so as to be vertically in axis with the coupling means with which the handles 2 and the upper cap 4 are provided.

[0027] As shown in Figs. 3 and 5, each of such counter-handles 3 comprises a frame having a preferably square or rectangular shape, in the form of a frame with only perimeter edges and empty inner surface.

[0028] Cusps 34 (typically in the form of hollow cylinders, projecting from such frame) are made on said

frame, in such quantity and position as to be located in axis with the aforementioned through seats 44 of the upper cap 4, in turn adapted to receive the tangs 24 of the proximal 23 and distal 22 ends of the handle 2.

[0029] The assembly between said pairs of handles 2 and counter-handles 3 is ensured by suitable constraint means 5, comprising self-threading screws 5 (or similar means with a similar fixing function) which are inserted from above into the through holes 25 of the handles 2, crossing the tangs 24 of the same and the through seats 44 of the upper cap 4, until engaging in said cusps 34 of such counter-handles 3.

[0030] Once the assembly is completed, it is possible to provide for the application of plugs 51, to cover the through holes 25.

[0031] According to a variant not shown in figure, such constraint means 5 may comprise jointing means directly integrated to the proximal 23 and distal 22 ends of the handles 2, for example pins intended to engage and lock into the cusps 34 of the counter-handles 3.

[0032] The gripping means 1 according to the invention therefore comprise an assembly consisting of the aforementioned pair of handles 2 (positioned above the upper cap 4 of the water heater WH) and of said pair of counter-handles 3 (located below such upper cap 4), with the upper cap 4 that is therefore located between the two pairs of elements.

[0033] In addition to the aforementioned constraint means 5, the stable assembly of the gripping means 1 is further ensured by the gripping action exerted by the insulating material F towards the counter-handles 3 (and, consequently, towards the upper cap 4).

[0034] In fact, once the construction process of the water heater WH has been completed, said counter-handles 3 are firmly incorporated in the insulating material F, following the expansion and stiffening steps thereof, giving the assembly "gripping means 1 - upper cap 4 - housing S" of the WH water heater a higher resistance to the mechanical stresses produced during the handling activities thereof.

[0035] In accordance with the preferred variant of the attached figures, such counter-handles 3 have a frame-like shape of the structure, so as to allow the insulating material F to settle and also occupy the empty space circumscribed by the edges of such structure, maximizing the overall degree of thermal and acoustic insulation ensured by the insulating material F.

[0036] The production process of the water heater WH, provided with gripping means 1, according to the invention, comprises in sequence at least the following steps:

a) assembly to the upper cap 4 of the gripping means 1 as described above, prior to coupling between the pair of handles 2 and the pair of counter-handles 3;
b) assembly of such upper cap 4 on the housing S, typically by the coupling of the respective edges;
c) insertion of the tank T inside the housing S and closing of such housing S with application of the lower cap, still by coupling of the respective edges;
d) overturning of the water heater WH, with consequent inversion of the position of the upper 4 and lower caps, with the latter now facing upwards and vice versa;
e) introduction of the insulating material F, in the liquid state, inside the plenum between the outer surface of said tank T and the inner surface of said housing S, through a hole made on said lower cap by means of which a known injection system introduces the necessary quantity of insulating material F;
f) deposition by gravity of such insulating material F on the bottom of the plenum (typically represented by low density polyurethane foam, capable of carrying out the chemical reaction thereof after about 1 minute from the injection), with subsequent expansion and gradual filling upwards of the entire plenum;
g) completion of the expansion step of such insulating material F and the consequent stiffening thereof, with definitive transition from the initial liquid state to the conclusive solid state.

[0037] At the end of such production process, the counter-handles 3 are therefore completely incorporated in the insulating material F, obtaining a permanent structural constraint which allows a better distribution of the forces during the handling operations of the water heater WH, increasing the mechanical resistance of the assembly "gripping means 1 - upper cap 4 - housing S".

[0038] In addition to such structural and mechanical benefits, a further advantage concerns the reduced aesthetic impact of the gripping means 1, which remain visually integrated in the upper cap 4 of the water heater WH, given the substantial alignment of the lying plane of the handles 2 with the rest of the surface of such cap.

[0039] It is clear that several variants of the water heater WH provided with the above described gripping means 1 are possible to the man skilled in the art, without departing from the novelty scopes of the inventive idea, as well as it is clear that in the practical embodiment of the invention the various components described above may be replaced with technically equivalent ones.

[0040] For example, for simplicity of description a variant of the invention has been described and shown in figure comprising a single storage tank T: however the teachings of the invention are invariably applied also to storage water heaters WH of the so-called "Flat" type, i. e. comprising more than one tank T, typically two tanks T reciprocally connected in series or in parallel.

Claims

1. Water heater (WH), in particular a storage water heater, comprising at least:

   - at least one storage tank (T) adapted to contain the volume of water to be heated.

- a containment housing (S), adapted to incorporate and protect said at least one tank (T), comprising a shell closed above by an upper cap (4) and below by a lower cap,
- a layer of insulating material (F), injected at the liquid state in the plenum comprised between the outer surface of said at least one tank (T) and the inner surface of said housing (S) and capable of expanding and stiffening in a solid state,
- gripping means (1) for the handling of said water heater (WH),

characterised in that

said gripping means (1) are integrated with said upper cap (4) by means of reciprocal coupling means (24, 25, 34, 44),
said gripping means (1) comprising:

- a pair of handles (2), each of which is:

  - located above said upper cap (4),
  - provided with coupling means (24, 25) with reciprocal coupling means (44) obtained in said upper cap (4);

- a pair of counter-handles (3), each of which is:

  - located below said upper cap (4),
  - provided with coupling means (34) with said reciprocal coupling means (44) obtained in said upper cap (4);

- constraint means (5) for said reciprocal coupling means (24, 25, 34, 44) of said upper cap (4) and of said pairs of handles (2) and counter-handles (3);

said pair of counter-handles (3) being incorporated in said insulating material (F) following its transition from the liquid to the solid state.

2. Water heater (WH) according to claim 1, **characterised in that**
each of said handles (2) comprises:

- a median portion (21), horizontally elongated according to an axis substantially parallel to the plane of said upper cap (4),
- a proximal end (23) ending in the substantially central zone of said upper cap (4),
- a distal end (22) ending in the proximity of the side edge of said upper cap (4),
- said coupling means (24, 25) comprising through holes (25) obtained on said proximal (23) and distal (22) ends, crossing respective tangs (24) projecting below from said proximal (23) and distal (22) ends.

3. Water heater (WH) according to the previous claim, **characterised in that**
said reciprocal coupling means (44) obtained in said upper cap (4) comprise through seats (44), adapted to shape couple and/or insert by interference with said tangs (24) of said handles (2).

4. Water heater (WH) according to the previous claim, **characterised in that**
said through seats (44) are obtained on the edges of a recess (43) made on the upper surface of said upper cap (4).

5. Water heater (WH) according to the previous claim, **characterised in that**
said recess (43) is made below each one of said handles (2) and has sizes and depth adapted to allow the insertion of the hand of the user or of lifting means.

6. Water heater (WH) according to any one of claims 3 to 5,
characterised in that
each of said counter-handles (3) comprises:

- a frame with only perimeter edges.
- said coupling means (34) with said reciprocal coupling means (44) obtained in said upper cap (4) comprising cusps (34) projecting from said frame;

7. Water heater (WH) according to the previous claim, **characterised in that**
said constraint means (5) for said reciprocal coupling means (24, 25, 34, 44) of said upper cap (4) and of said pair of handles (2) and counter-handles (3) comprise self-threading screws (5) or similar means, inserted from above in said through holes (25), crossing said tangs (24) of said handles (2) and said through seats (44) of said upper cap (4), up to engage in said cusps (34) of said counter-handles (3).

8. Water heater (WH) according to claim 6 or 7, **characterised in that**
said constraint means (5) for said reciprocal coupling means (24, 25, 34, 44) of said upper cap (4) and of said pairs of handles (2) and counter-handles (3) comprises jointing means integrated directly to said proximal (23) and distal (22) ends of said handles (2), such as pins adapted to engage and lock in said cusps (34) of said counter-handles (3).

9. Water heater (WH) according to any one of claims 2 to 8,
characterised in that

said through holes (25) of said handles (2) are covered by plugs (51)

10. Water heater (WH) according to any previous claims, **characterised in that**

each handle (2) of said pair of handles (2) is located above said upper cap (4) at a distance of 180° from each other,
and **in that**
each counter-handle (3) of said pair of counter-handles (3) is located below said upper cap (4) at a distance of 180° from each other,

11. Production process of a water heater (WH), in particular a storage water heater, comprising:

- at least one storage tank (T) adapted to contain the volume of water to be heated.
- a containment housing (S), adapted to incorporate and protect said at least one tank (T), comprising a shell closed above by an upper cap (4) and below by a lower cap,
- a layer of insulating material (F), injected at the liquid state in the plenum comprised between the outer surface of said at least one tank (T) and the inner surface of said housing (S) and capable of expanding and stiffening in a solid state,

characterised in that it comprises at least the following sequential steps:

a) assembling the gripping means (1) to said upper cap (4) according to claims 1 to 10, by coupling the pair of handles (2) to the pair of counter-handles (3) in said upper cap (4).
b) mounting said upper cap (4) to said housing (S),
c) inserting at least one tank (T) inside said housing (S) and closing said housing (S) by applying the lower cap to it.
d) turning said water heater (WH) upside down,
e) injecting said insulating material (F) in the liquid state into said plenum, through a hole made on said lower cap,
f) waiting for the deposition by gravity of said insulating material (F) on the bottom of said plenum, with its expansion and gradual filling up of said plenum,
g) waiting for the completion of the expansion step of said insulating material (F), with transition from the liquid state to the solid state, the counter-handles (3) of said gripping means (1) remaining incorporated in said insulating material (F).

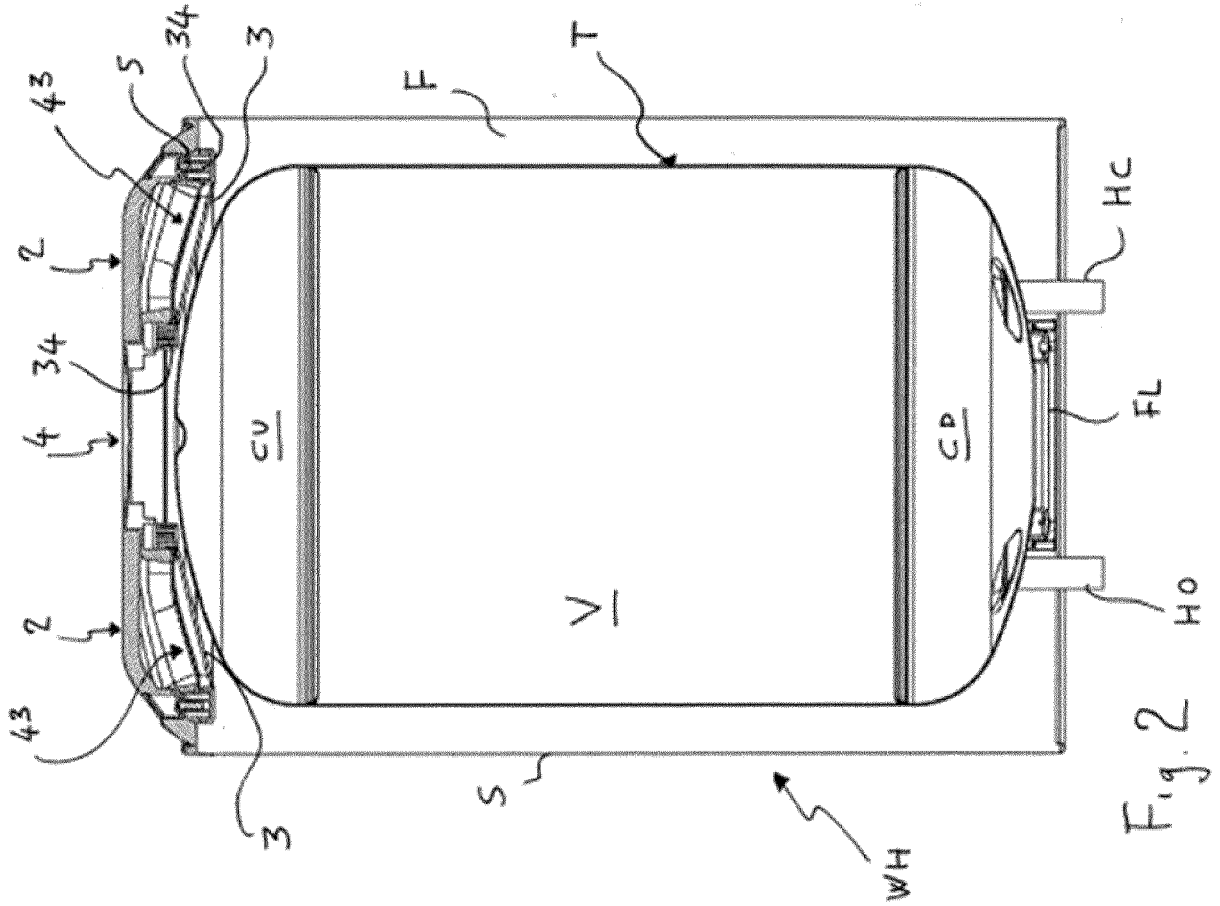


Fig. 2

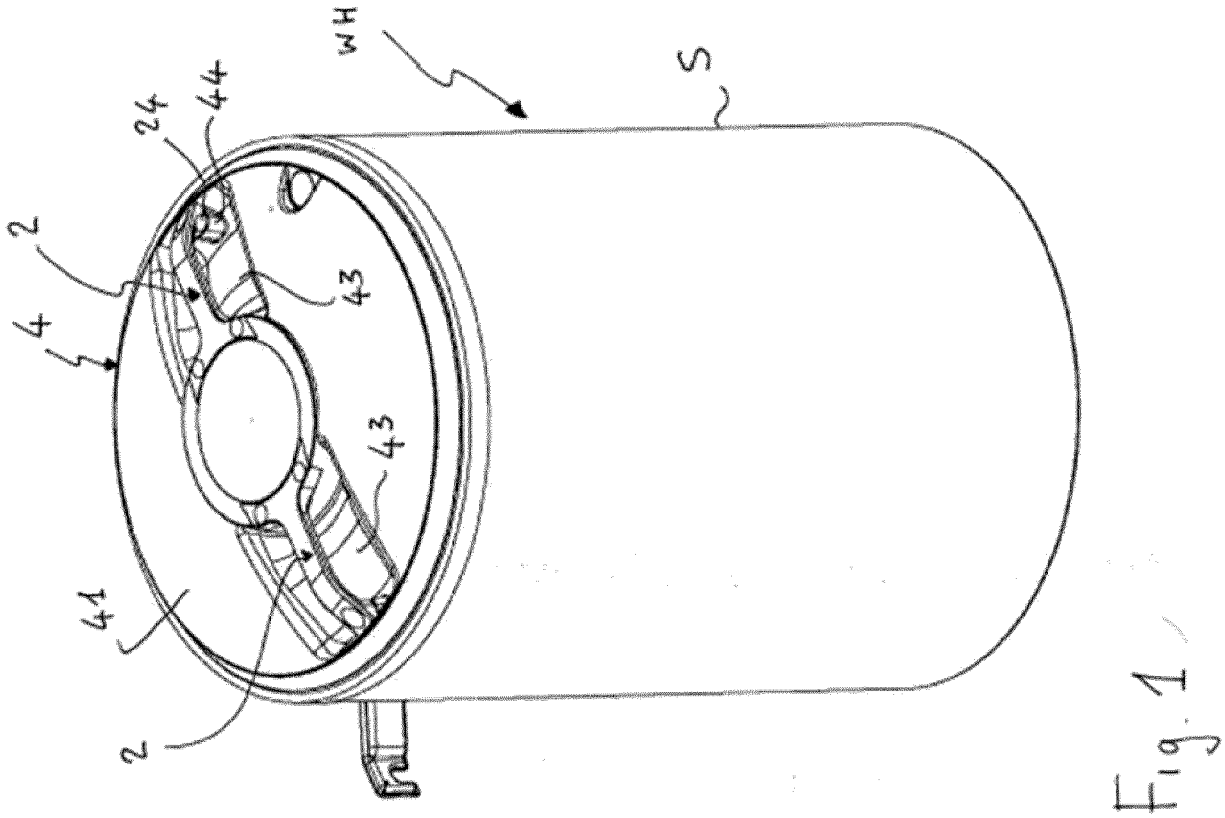


Fig. 1

Fig. 4

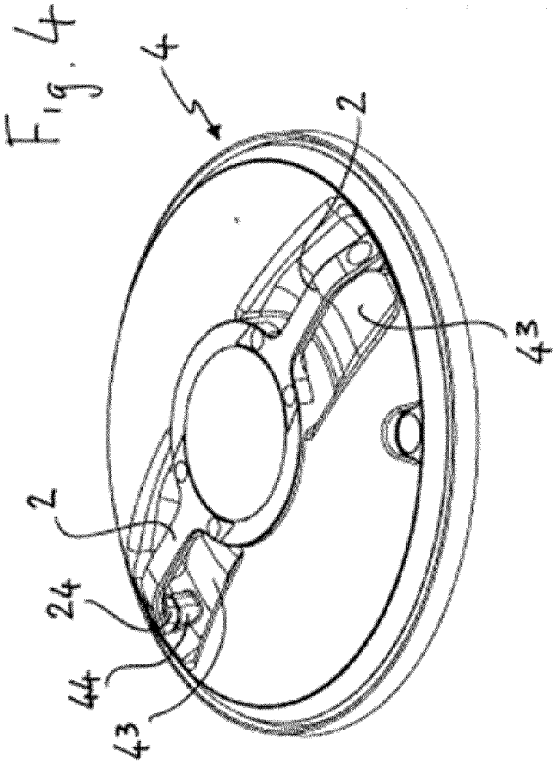
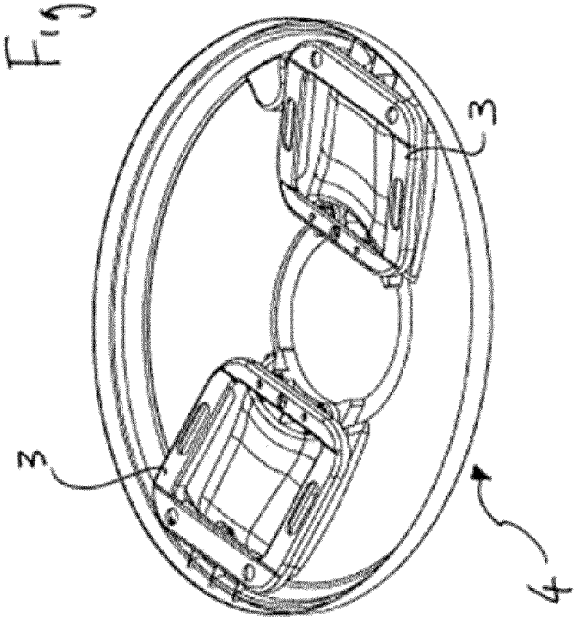


Fig. 5



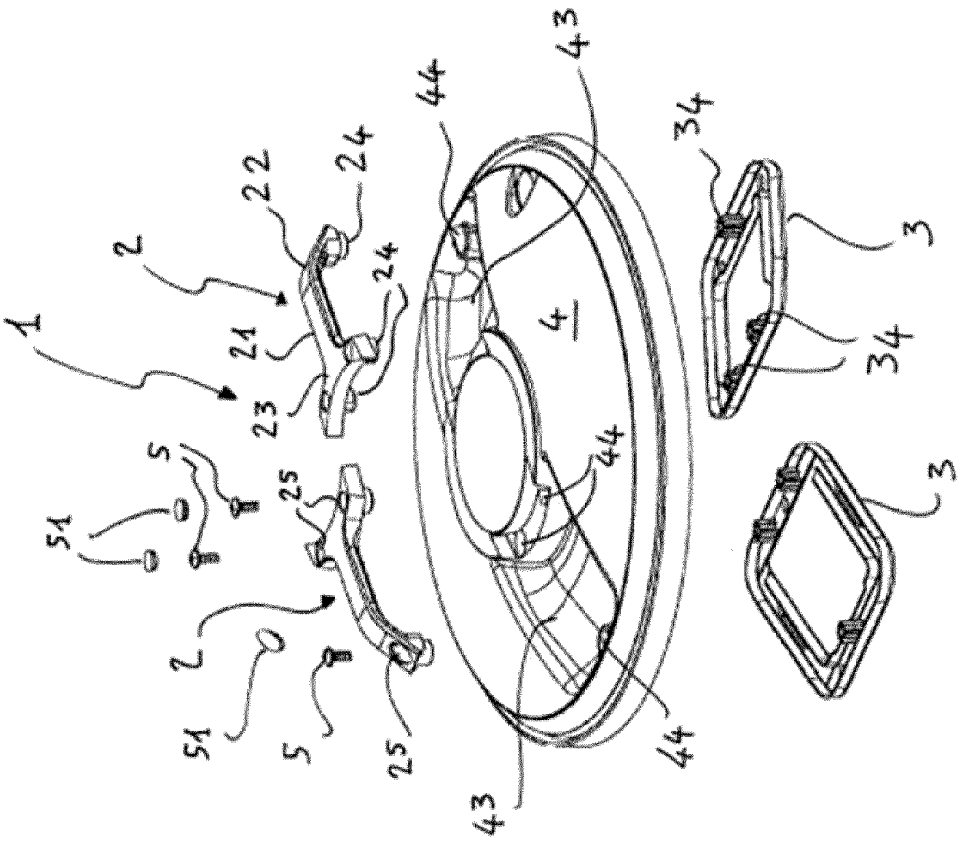


Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 23 17 8374

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	DE 203 18 060 U1 (BUDERUS HEIZTECHNIK GMBH [DE]) 19 February 2004 (2004-02-19) * paragraph [0009] - paragraph [0014] *	1-11	INV. F24H1/18 F24H9/00
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A,D	US 2008/196200 A1 (MESSERSMITH MICHAEL JOHN [US]) 21 August 2008 (2008-08-21) * paragraph [0009] - paragraph [0022]; figures 1-5 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC) F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 June 2023	Ast, Gabor

CATEGORY OF CITED DOCUMENTS

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26-06-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 20318060 U1	19-02-2004	NONE	
EP 3462104 A1	03-04-2019	NONE	
US 2008196200 A1	21-08-2008	NONE	

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

REFERENCES CITED IN THE DESCRIPTION

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