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

(11) **EP 3 225 919 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.10.2017 Bulletin 2017/40

(51) Int Cl.:
F24C 15/16 *(2006.01)*

(21) Application number: **16162727.8**

(22) Date of filing: **30.03.2016**

(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:
MA MD

(71) Applicant: **Electrolux Appliances Aktiebolag**
105 45 Stockholm (SE)

(72) Inventor: **CETINTAS, Sakir**
91541 Rothenburg o. d. Tauber (DE)

(74) Representative: **Electrolux Group Patents**
AB Electrolux
Group Patents
105 45 Stockholm (SE)

(54) **FASTENING ELEMENT AND HOUSEHOLD APPLIANCE COMPRISING SAID FASTENING ELEMENT**

(57) The invention relates to a fastening element for fixing a component (11) at a side grid (10) comprising multiple rods (10.1), the fastening element (20) comprising an upper holding section (21), a lower holding section (22) and a middle section (23) being arranged between the upper and lower holding section (21, 22), wherein the upper and lower holding sections (21, 22) are adapted to encompass a rod (10.1) at an upper side in order to enable hanging arrangement of the fastening element (20) on the side grid (10) by a top-down movement and wherein the fastening element (20) further comprises a lock portion (24), the lock portion (24) being reversibly deformable between a locked and an unlocked state, the lock portion (24) being further adapted to interact with a lower side of a rod (10.1) in the locked state in order to avoid unhooking of the fastening element (20) in said locked state.

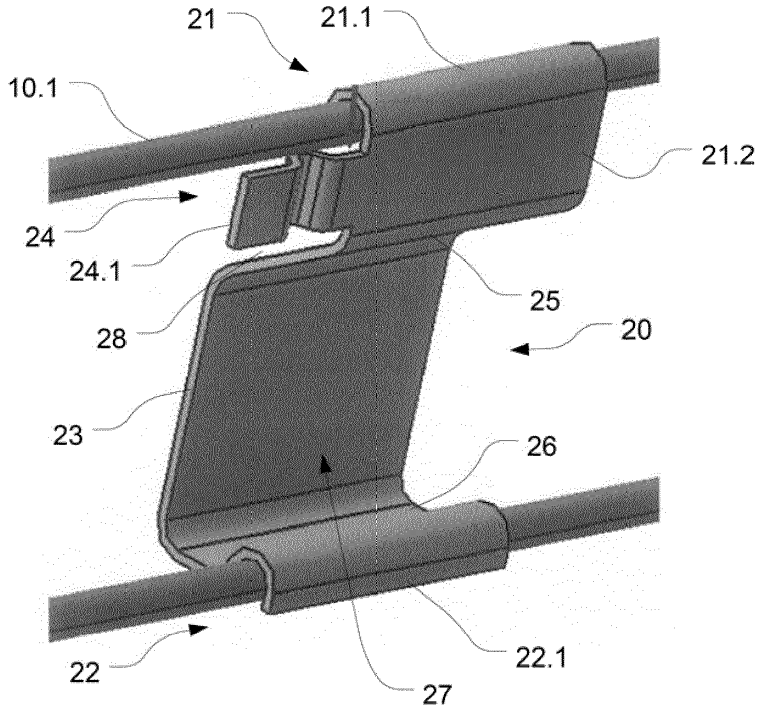

Fig. 3

EP 3 225 919 A1

Description

[0001] The present invention generally relates to the field of fastening elements. More specifically, the present invention is related to fastening elements for arranging components at a side grid of a household appliance.

BACKGROUND OF THE INVENTION

[0002] Fastening elements for fixing components, specifically telescopic runners at a side grid of a household appliance are known in prior art.

[0003] For example, document DE 101 16 471 B4 discloses a fastening element for telescopic runners within a baking oven. Said fastening element comprises a C-shape configuration, i.e. the fastening element is arranged at a pair of rods of a side grid, wherein an upper holding portion of the fastening element encompasses a first rod of said pair of rods at an upper side and a lower holding portion encompasses a second rod of said pair of rods at a lower side. In addition, the fastening element comprises a snap-on mechanism which enables a detachable connection of the fastening element at the side grid.

[0004] Disadvantageously, the known fastening element shows a difficult handling because for disengaging the fastening element from the side grid, the fastening element has to be rotated around a horizontal axis.

SUMMARY OF THE INVENTION

[0005] It is an objective of the embodiments of the invention to provide fastening element which provides a solid fixation of components at a side grid and which is easy to handle. The objective is solved by the features of independent claims. Preferred embodiments are given in the dependent claims. If not explicitly indicated otherwise, embodiments of the invention can be freely combined with each other.

[0006] According to an aspect, a fastening element is disclosed. The fastening element is adapted to arrange a component at a side grid comprising multiple rods. The fastening element comprises an upper holding section, a lower holding section and a middle section being arranged between the upper and lower holding section. The upper and lower holding sections are adapted to encompass a rod at an upper side in order to enable a hanging arrangement of the fastening element at the side grid by a top-down movement. The fastening element further comprises a lock portion, the lock portion being reversibly deformable, e.g. by bending between a locked and an unlocked state. Thereby, the lock portion interacts with a lower side of a rod in the locked state in order to avoid unhooking of the fastening element in said locked state.

[0007] Advantageously, said fastening element comprises hook-like holding sections with downwardly directed apertures thereby being configured to be arranged at the rods of the side grid by a top-down movement. Thereby a solid and easy-to-handle fixation of components at a side grid of a household appliance is obtained.

[0008] According to embodiments, the upper holding section comprises a hook-like shape. For example, the upper holding section comprises a semi-circle shaped end portion, said semi-circle shaped end portion comprising a bottom-side aperture for receiving a rod of the side grid. Said semi-circle shaped end portion may form a receiving area adapted to the dimensions of the rod in order to encompass the rod at an upper side in a form-locking way.

[0009] According to embodiments, the lower holding section comprises a hook-like shape. For example, the lower holding section comprises a semi-circle shaped end portion, said semi-circle shaped end portion comprising a bottom-side aperture for receiving a rod of the side grid. Said semi-circle shaped end portion may form a receiving area adapted to the dimensions of the rod in order to encompass the rod at an upper side in a form-locking way.

[0010] According to embodiments, the lock portion is formed by a tounge-like portion being obtained by one or more cuts or slits separating the lock portion from the remaining fastening element portions. Thereby a reversible movement of the lock portion between the locked and the unlocked state is possible.

[0011] According to embodiments, the lock portion comprises a grip portion, said grip portion being arranged such that the grip portion can be handled at a front side at which the component is fixable. For example, the grip portion may be arranged in or in front of a plane spanned by the rod receiving portions of the fastening element. Thereby the grip portion is easy to reach which improved the handling of the fixing element.

[0012] According to embodiments, the lock portion comprises a longitudinal axis, said longitudinal axis extending in the horizontal or vertical direction. In other words, the lock portion may be bendable with respect to a vertical or horizontal axis.

[0013] According to embodiments, the fastening element comprises a U-like shape thereby forming a recess for receiving the component in order to integrate the component in the space between an upper rod and a lower rod of the side grid. Thereby, improvements regarding the usage of cavity space within household appliances are obtained.

[0014] According to embodiments, the upper holding section comprises a base portion and the lock portion extends laterally from said base portion. For example, the base portion may be arranged in direct proximity to and below the hook-shaped free end of said upper holding section. Preferably, the base portion may be parallel to the plane including the rod-receiving portions of the upper and lower holding section. Thus, by bending the lock portion with respect to a vertical axis, the fastening element can be removed from the side grid.

[0015] According to embodiments, the lock portion

comprises a protrusion engaging below the lower side of the rod in the locked state. Thereby, an upwardly directed movement leading to a disengaging of the fastening element is prevented.

[0016] According to embodiments, the lock portion comprises a hook-like shape and is integrated in the lower holding section. For example, the lock portion may be adapted to provide a snap-on mechanism at a rod received in the lower holding section. Specifically, the lock portion may provide a protrusion, said protrusion being arranged at the lower side of the rod in the locked state in order to avoid an undesired decoupling. By bending the lock portion, said protrusion does not interact with the rod anymore and the fastening element can be moved upwardly in order to disassemble the fastening element from said side grid.

[0017] According to embodiments, the lower holding section comprises two counter-bearing portions, said counter-bearing portions being arranged at different sides of the lock portion. Said counter-bearing portions being may interact with a locking portion arranged between said counter-bearing portions in order to obtain an encompassing of a rod.

[0018] According to embodiments, the upper holding section comprises two hook portions and the lock portion is arranged between said two hook portions. Said lock portion may interact with the lower side of the rod in order to avoid an undesired unhooking of the fastening element in the locked state.

[0019] According to embodiments, the longitudinal axis of the lock portion extends in vertical direction and is bendable around a horizontal axis in order to unlock the fastening element. Thereby a secure fixing of the fastening element at the side grid is obtained.

[0020] According to a further aspect, the invention relates to a household appliance with a cavity and a pair of side grids included in the cavity, wherein components, specifically telescopic runners are attached to said side grids by means of fastening elements. The fastening elements may be configured according to one of the upper-mentioned embodiments.

[0021] The term "household applicance" according to the present invention may refer to any appliance used in domestic or commercial kitchens, specifically baking ovens etc.

[0022] The term "essentially" or "approximately" as used in the invention means deviations from the exact value by +/- 10%, preferably by +/- 5% and/or deviations in the form of changes that are insignificant for the function.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The various aspects of the invention, including its particular features and advantages, will be readily understood from the following detailed description and the accompanying drawings, in which:

Fig. 1 shows a schematic view of a household appliance;

Fig. 2 shows a perspective view of a side grid including a telescopic runner attached to said side grid by means of a pair of fastening elements;

Fig. 3 shows a first embodiment of a fastening element;

Fig. 4 shows a second embodiment of a fastening element; and

Fig. 5 shows a third embodiment of a fastening element.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0024] The present invention will now be described more fully with reference to the accompanying drawings, in which example embodiments are shown. However, this invention should not be construed as limited to the embodiments set forth herein. Throughout the following description similar reference numerals have been used to denote similar elements, parts, items or features, when applicable.

[0025] Fig. 1 shows a schematic illustration of a household appliance 1, according to the present embodiment constituted by a baking oven. The household appliance 1 comprises a cavity 1.1 for receiving the food to be cooked or baked. In order to be able to place, for example, food in a desired height within the cavity 1.1, at opposite side walls of the cavity 1.1 a pair of side grids 10 is arranged.

[0026] Fig. 2 shows such side grid 10. The side grid 10 may comprise multiple horizontal rods 10.1 thereby spanning a vertical or essentially vertical plane of rods 10.1. Said rods 10.1 may be metal rods comprising a round cross section. In order to attach a component 11, specifically telescopic runners at said side grid 10, at least two fastening elements 20 are provided. Said fastening elements 20 may be quick-fixing elements which ensure a releasable mounting of said component 11 at the side grid 10.

[0027] Fig. 3 shows a first embodiment of the fastening element 20. The fastening element 20 comprises an upper holding section 21, a lower holding section 22 and a middle section 23 arranged between said upper and lower holding section 21, 22. The upper and lower holding section 21, 22 comprises hook-shaped end portions 21.1, 22.1 which are adapted to at least partially encompass a rod 10.1 of the side grid 10. Preferably, the hook-shaped end portions 21.1, 22.1 are adapted to the dimensions of the rods 10.1 in order to enable a form-fitted attachment of the fastening element 20 at said rod 10.1.

[0028] Following the hock-shaped end portion 21.1, the upper holding section 21 comprises a base portion

21.2. After attaching the fastening element 20 at the side grid 10, said base portion 21.2 may be vertically arranged. Finally, the fastening element 20 comprises coupling portions 25, 26 for connecting the upper and lower holding sections 21, 22 with said middle portion 23. Said coupling portions 25, 26 may protrude from said upper and lower holding sections 21, 22 backwardly. Thereby, the middle portion 23 is horizontally offset with respect to the upper and lower holding section 21, 22 thereby obtaining a recess 27 in which said component 11 may be received.

[0029] Due to the hook-shaped end portions 21.1, 22.1 which comprise receiving areas with openings at the lower side for inserting the rods 10.1, the fastening elements 20 can be attached at the side grid 10 by a top-down movement.

[0030] In order to avoid an undesired disengaging of the fastening element 20 from the side grid 10, a lock portion 24 is provided. The lock portion 24 may be a tongue-like projection which is reversibly deformable. Without applying external forces, the lock portion 24 may be arranged in a locked state (shown in Figures 4 to 6). More in detail, in the locked state, at least a section of the lock portion 24 interacts with the lower side of the rod 10.1 thereby preventing an undesired loosening of the connection between the fastening element 20 and the side grid 10.

By applying external forces, the lock portion 24 can be pulled in an unlocked state in which the lock portion 24 does not engage behind the lower portion of the rod 10.1 anymore. Thereby, the fastening element can be moved upwardly in order to unhook the fastening element 20.

[0031] According to the embodiment of Fig. 3, the lock portion 24 is horizontally arranged and extends in a direction parallel to the rod 10.1 to be included in the upper hook-shaped end portions 21.1. Preferably, the lock portion 24 may laterally protrude from upper-mentioned base portion 21.2.

[0032] The lock portion 24 further comprises a grip portion 24.1. Said grip portion 24.1 may be arranged above the recess 27 for receiving the component 11. Thereby, the grip portion 24.1 may be easily accessible from the front side thereby simplifying the handling of the lock mechanism.

[0033] Fig. 4 shows a second embodiment of a fastening element 20. The fastening element 20 also comprises an upper holding section 21, a lower holding section 22 and a middle section 23 arranged between said upper and lower holding section 21, 22. The upper holding section 21 also comprises hook-shaped end portion 21.1 which is adapted to at least partially encompass a rod 10.1 of the side grid 10. Preferably, the hook-shaped end portion 21.1 is adapted to the dimensions of the rods 10.1 in order to enable a form-fitted attachment of the fastening element 20 at said rod 10.1.

[0034] The upper holding section 21 also comprises a base portion 21.2 which may be vertically arranged when attaching the fastening element 20 at the side grid 10. Finally, the fastening element 20 also comprises coupling portions 25, 26 for connecting the upper and lower holding sections 21, 22 with said middle portion 23. Said coupling portions 25, 26 may protrude from said upper and lower holding sections 21, 22 to the back. Thereby, the middle portion 23 is horizontally offset with respect to the upper and lower holding section 21, 22 thereby obtaining a recess 27 in which said component 11 may be received.

[0035] In contrast to the first embodiment according to fig. 3, the lock portion 24 according to the embodiment of fig. 4 is integrated in the lower holding section 22. The lower holding section 22 is segmented in multiple portions which are horizontally arranged next to each other. More in detail, the lower holding section 22 comprises two counter-bearing portions 22.2. Said counter-bearing portions 22.2 are arranged at both sides of the lock portion 24. The counter-bearing portions 22.2 may be separated from the lock portion 24 by slits 28. The counter-bearing portions 22.2 build a contact surface for the rod 10.1 at a first side whereas the lock portion 24 builds a contact surface for the rod 10.1 at a second side opposite to said first side thereby realizing a lateral fixing of the fastening element 20 at the side grid 10.

[0036] In addition, the lock portion 24 encompasses the rod 10.1 from an upper side towards a lower side thereby forming a snap-on element securing the fastening element 20 against undesired loosening. The lock portion 24 may also comprise a grip portion 24.1, said grip portion 24.1 protruding downwards. The lock mechanism provided by the lock portion 24 can be disengaged by pulling the grip portion 24.1 in a forward direction (as indicated by the arrow).

[0037] Fig. 5 shows a third embodiment of the fastening element 20. Similar to the embodiments according to Fig. 3 and 4, the fastening element 20 also comprises an upper holding section 21, a lower holding section 22 and a middle section 23 arranged between said upper and lower holding section 21, 22. In the area of the middle section 23, the fastening element 20 comprises a recess 27 for receiving a component 11. The upper and lower holding sections 21, 22 are adapted to enable a hanging arrangement of the fastening element 20 at a pair of rods 10.1.

[0038] Different to the upper-described embodiments, the lock mechanism is integrated in the upper holding section 21. More in detail, the upper holding section 21 comprises multiple tongue-shaped segments. According to the present embodiment, the upper holding section 21 comprises three segments. The outer segments comprise hook-shaped end portions 21.1 in order to encompass a first rod 10.1. The middle segment forms the lock portion 24. The lock portion 24 may be separated from said outer segments by means of slits in order to enable a movement of the lock portion 24 between a locked and an unlocked state.

[0039] The longitudinal axis of the lock portion 24 may be arranged in a vertical direction and the lock portion 24 may be bendable with respect to a horizontal axis in

order to move the lock portion 24 from the locked state in which the lock portion 24 blocks disengaging the fastening element 20 by being at least partially placed beneath the first rod 10.1 into the unlocked state in which the fastening element 10 can be moved upwardly in order to disengage the fastening element 20. The lock portion 24 comprises a grip portion 24.1 which protrudes in a forward direction perpendicular to the longitudinal axis of the rods 10.1 in order to be able to grasp the grip portion 24.1 easily.

[0040] According to the embodiment of Fig. 5, the lower holding section 22 also comprises multiple segments. Said segments may also be separated by slits. The outer segments of the lower holding section 22 may be adapted to provide outer and upper contact surfaces for a second rod 10.1 whereas the middle segment provides an inner contact surface for said second rod 10.1. Also a vice versa configuration is feasible. Due to the interaction of said segments of the lower holding section 22, the second rod is encompassed at an upper region and at opposite side regions of the rod 10.1 thereby realizing a fixation of the fastening element at said second rod 10.1.

[0041] It is worth mentioning that upper-described configuration of the lower holding section 22 can also be realized within the embodiment according to fig. 3. Similarly, also the upper holding section 21 may be segmented comprising multiple segments according to the embodiment of the lower holding section 22 of Fig. 5.

[0042] The upper-described fastening elements 12 may be single-piece elements integrally formed out of sheet metal, e.g. by punching and bending.

[0043] It should be noted that the description and drawings merely illustrate the principles of the proposed methods and systems. Those skilled in the art will be able to implement various arrangements that, although not explicitly described or shown herein, embody the principles of the invention.

List of reference numerals

[0044]

1	household appliance
1.1	cavity
10	side grid
10.1	rod
20	fastening element
21	upper holding section
21.1	end portion
21.2	base portion
22	lower holding section
22.1	end portion
22.2	counter-bearing portion
23	middle section
24	lock portion
24.1	grip portion
25, 26	coupling portion
27	recess
28	slit

Claims

1. Fastening element for fixing a component (11) at a side grid (10) comprising multiple rods (10.1), the fastening element (20) comprising an upper holding section (21), a lower holding section (22) and a middle section (23) being arranged between the upper and lower holding section (21, 22), wherein the upper and lower holding sections (21, 22) are adapted to encompass a rod (10.1) at an upper side in order to enable hanging arrangement of the fastening element (20) on the side grid (10) by a top-down movement and wherein the fastening element (20) further comprises a lock portion (24), the lock portion (24) being reversibly deformable between a locked and an unlocked state, the lock portion (24) being further adapted to interact with a lower side of a rod (10.1) in the locked state in order to avoid unhooking of the fastening element (20) in said locked state.

2. Fastening element according to claim 1, wherein upper holding section (21) comprises a hook-shaped end portion (21.1).

3. Fastening element according to claim 1 or 2, wherein the lower holding section (22) comprises a hook-shaped end portion (22.1).

4. Fastening element according to anyone of the preceding claims, wherein the lock portion (24) is formed by a tounge-like portion being obtained by one or more cuts separating the lock portion (24) from the remaining fastening element portions.

5. Fastening element according to anyone of the preceding claims, wherein the lock portion (24) comprises a grip portion (24.1), said grip portion (24.1) being arranged such that the grip portion (24.1) can be handled at a front side at which the component (10) is fixable.

6. Fastening element according to anyone of the preceding claims, wherein the lock portion (24) comprises a longitudinal axis, said longitudinal axis extending in the horizontal or vertical direction.

7. Fastening element according to anyone of the preceding claims, comprising a U-like shape thereby forming a recess (27) for receiving the component (11) in order to integrate the component (11) in a space between an upper rod (10.1) and a lower rod (10.1) of the side grid (10).

8. Fastening element according to anyone of the pre-

ceding claims, wherein the upper holding section (21) comprises a base portion (21.2), said lock portion (24) extending laterally from said base portion (21.2).

9. Fastening element according to claim 8, wherein the lock portion (24) comprises a protrusion engaging below the lower side of the rod (10.2) in the locked state.

10. Fastening element according to anyone of the preceding claims, wherein the lock portion (24) comprises a hook-like shape and is integrated in the lower holding section (22).

11. Fastening element according to claim 10, wherein the lower holding section (22) comprises two counter-bearing portions (22.2), said counter-bearing portions (22.2) being arranged at different sides of the lock portion (24).

12. Fastening element according to anyone of the preceding claims, wherein the upper holding section (21) comprises two hook portions and the lock portion (24) is arranged between said hook portions.

13. Fastening element according to claim 12, wherein longitudinal axis of the lock portion (24) extends in the vertical direction and is bendable around a horizontal axis in order to unlock the fastening element (20).

14. Household appliance with a cavity (1.1) and a pair of side grids (10) included in the cavity (1.1), wherein components (10), specifically telescopic runners are attached to said side grids (10) by means of fastening elements (20), **characterized in that** the fastening elements (20) are configured according to anyone of the preceding claims.

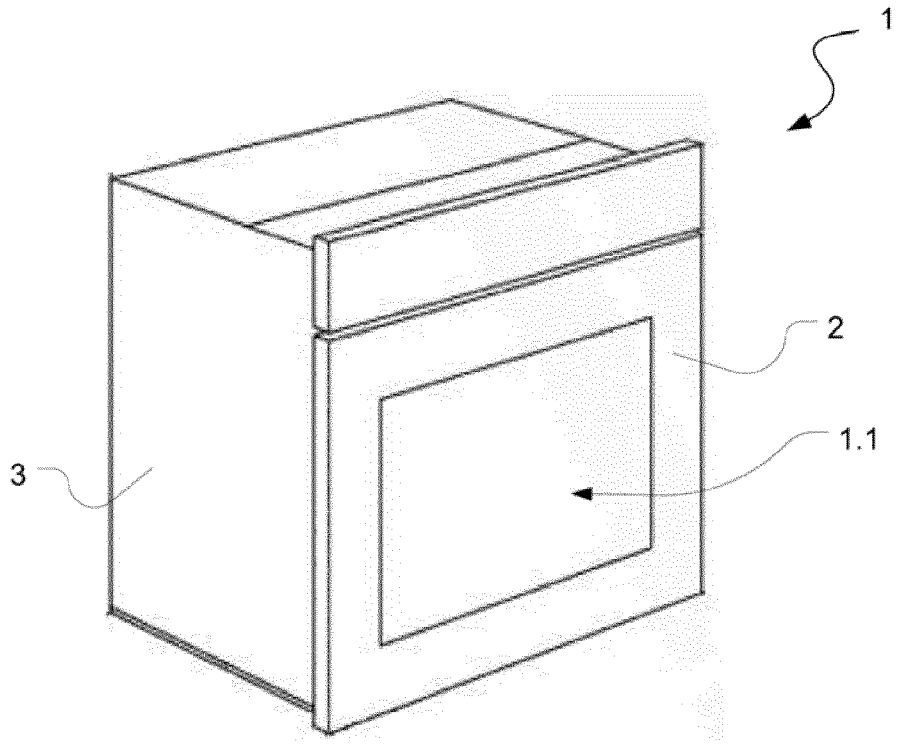

Fig. 1

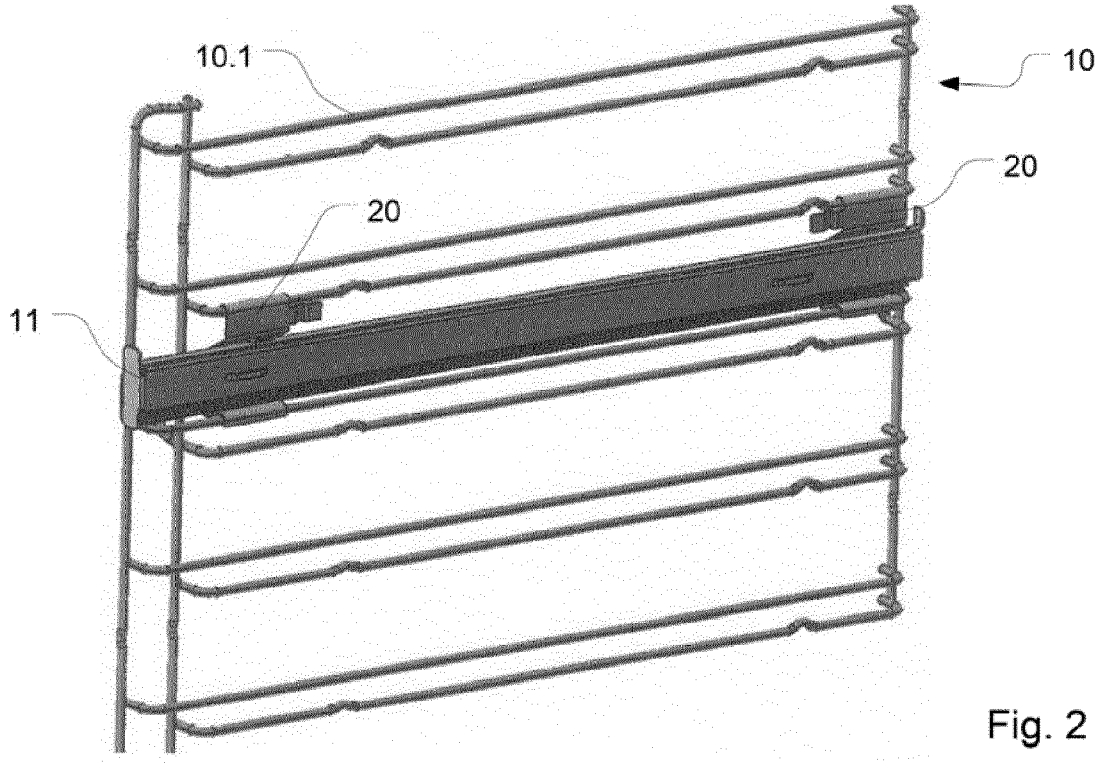

Fig. 2

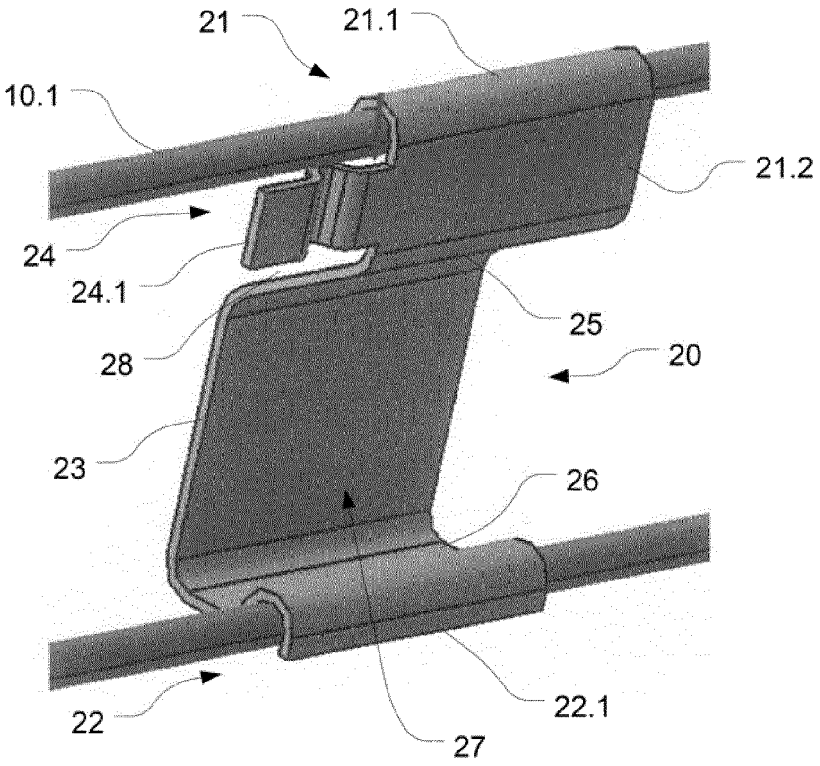
21
21.1
10.1
21.2
24
24.1
25
28
20
23
26
22.1
22
27

Fig. 3

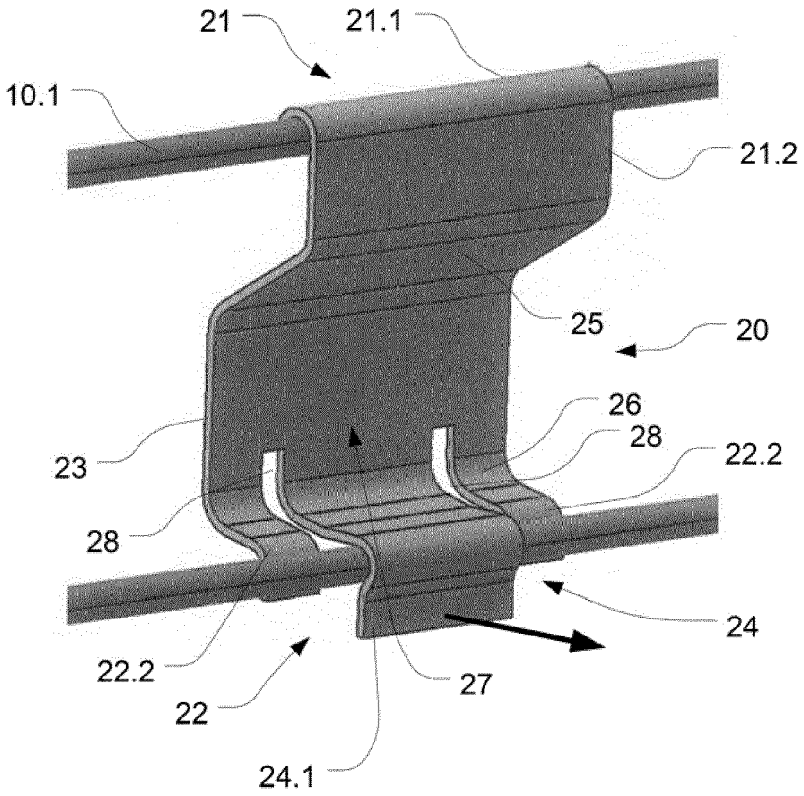
21
21.1
10.1
21.2
25
20
26
28
22.2
23
28
24
22.2
27
22
24.1

Fig. 4

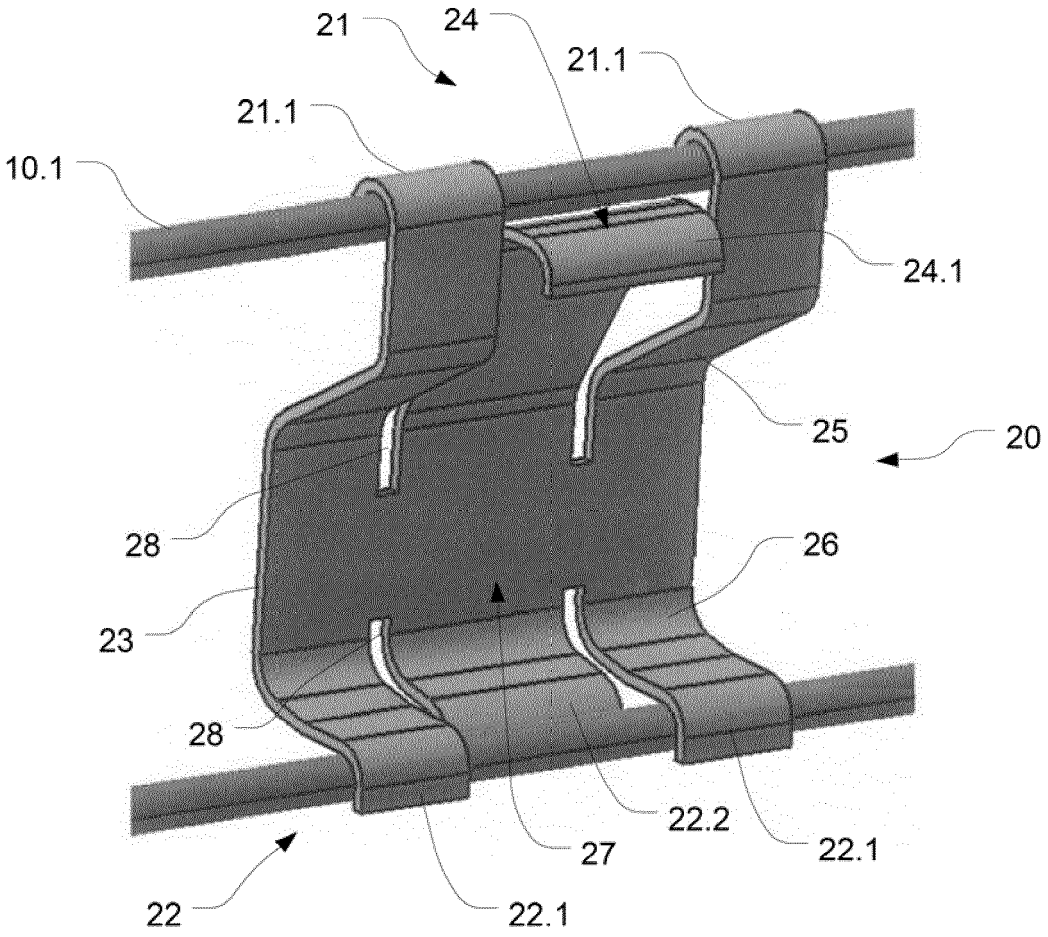

Fig. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 16 16 2727

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	DE 101 16 471 B4 (AMICA WRONKI S A [PL]) 7 October 2004 (2004-10-07) * the whole document *	1-3,5,6, 9-14	INV. F24C15/16
X	DE 10 2014 100992 A1 (ACCURIDE INT GMBH [DE]) 30 July 2015 (2015-07-30) * the whole document *	1-4,6-8, 10,14	
A	EP 2 144 009 A1 (ELECTROLUX HOME PROD CORP [BE]) 13 January 2010 (2010-01-13) * the whole document *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 July 2016	Makúch, Milan

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 16 16 2727

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.

08-07-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10116471 B4	07-10-2004	NONE	
DE 102014100992 A1	30-07-2015	DE 102014100992 A1	30-07-2015
		WO 2015113859 A1	06-08-2015
EP 2144009 A1	13-01-2010	AT 471490 T	15-07-2010
		AU 2009267457 A1	14-01-2010
		CA 2729838 A1	14-01-2010
		CN 102066844 A	18-05-2011
		EP 2144009 A1	13-01-2010
		US 2011100350 A1	05-05-2011
		WO 2010003554 A1	14-01-2010

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

- DE 10116471 B4 **[0003]**