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(71) Applicant: **ORKLI, S. COOP.**
20240 Ordizia (Gipuzkoa) (ES)

(72) Inventor: **Guirado Tristan, José Antonio**
20200 Beasain (Gipuzkoa) (ES)

(74) Representative: **Fernandez Guzman, Juan**
Apartado 213 (Dpto. Propiedad Industrial)
20500 Mondragon (Gipuzkoa) (ES)

Remarks:
Amended claims in accordance with Rule 86 (2) EPC.

(54) Flame thermocouple and gas safety valve with an electrical connection

(57) The flame detector thermocouple (5, 5a, 5b) and the safety valve (2) are fitted in a gas cooking appliance, and the "line" (6) and "ground" (7) terminals of the thermocouple (5) are plugged into the valve (2) by means of a compact connector (10), wherein the two terminals (6, 7) parallel to each other are inserted in a radial direction in relation to the axis (3a) of the valve. The ground terminal (7) is subdivided into two lateral arms (14) encircling a cylindrical-shaped "line" connecting post 9 in the valve. The front face flat (14a) of the ground terminal is urged up against a contact surface (8a) of a locknut (8) connected to the valve ground, thereby on their front face both arms (14) of the ground terminal (7) have an elastic rib (18) guided in a superficial groove (23) in the connector (10), which the connector is plugged in.

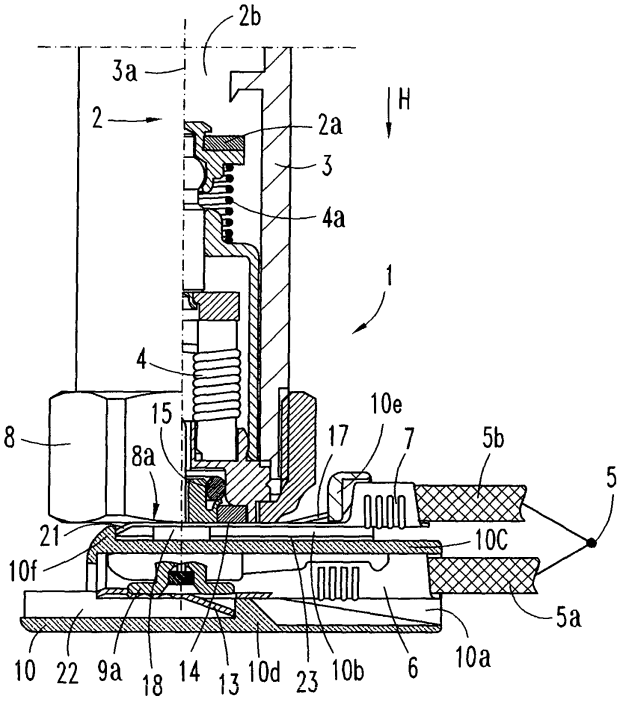


FIG. 1

EP 1 707 879 A1

Description

[0001] The present invention relates to a safety device on a gas cooker appliance, comprising an electromagnetic safety valve and a flame detector thermocouple and an electrical connection for the thermocouple wires to the valve.

Prior art

[0002] On a cooker hob equipped with a safety valve, the actuating electromagnet is supplied by a flame detector thermocouple through two electrical wires referred to as "line" and "ground", which are provided with a respective fast-on connecting terminal to be plugged in to the corresponding connection post on the valve. The safety valve is cylindrical shaped and is fitted in a metal housing in the gas regulating tap of the cooker tightly plugged with a metal locknut. The thermocouple "ground" terminal is connected to this locknut. The "line" terminal is connected to a cylindrical connection post on the valve, extended in the axial direction and protruding beyond the "ground" locknut. The valve line post has an annular groove for securing the thermocouple line terminal. An electrical adapter of this type for a safety valve has been known from EP-0691510-A.

[0003] Due to a limitation of space available in the cooker hob below the safety valve, the connecting operation of the thermocouple wires to the valve must be made from a traverse side, and the terminals inserted in a radial direction to the valve axis. FR-2696531-A3 discloses a flame detector thermocouple with two electrical wires, the "line" and the "ground", which are connected laterally to the safety valve electromagnet, radial oriented relative to the axis of the valve.

[0004] This known electrical connection has the drawback that the connections of both thermocouple wires to the valve are executed separately in two manual operations and, in addition, the "ground" terminal adds an electrical soldering operation on the surface of the regulating tap, for the purposes of its anchorage and a low electrical contact resistance.

Disclosure of the invention

[0005] The object of the present invention is a combination of a flame detector thermocouple and an electromagnetic safety valve adapted to a gas cooker hob, having both terminals of the thermocouple wires arranged in an insulating connector body, for plugging it into the safety valve connection posts, in a way oriented in a radial direction in relation to the axis of the valve.

[0006] It is an objective of the invention that the electrical connection of the two thermocouple wires and the safety valve should enable the fitter user to execute the connection of both fast-on terminals in a single quick operation on the respective valve connection post, the axial extended "line" post and the "ground" post being a valve housing locknut, exposing externally a substantially flat contact face for the ground terminal. Both terminals are included in a hollow insulating body connector, providing a low electrical resistance contact connection between the ground terminal and the valve outer locknut, as well as secure anchorage of the electrical wires to the valve once they are plugged in.

Description of the drawings

[0007]

FIG. 1 is a sectional view of a flame thermocouple and a gas safety valve, and an electrical connection between them according to the invention.

FIG. 2 is a partial sectional view of the electrical connection to the safety valve in figure 1, on a line parallel to the valve axis.

FIG. 3 is a perspective view of a terminals connector of the thermocouple of FIG. 1.

FIG. 4A and FIG. 4B are two views of the connection terminal corresponding to the "ground" wire of the thermocouple of figures 1 and 2.

Detailed description of an embodiment of the invention

[0008] With reference to FIG. 1 and FIG. 2, an embodiment of gas safety device 1 comprises a safety valve 2 with a plug 2a, an actuating electromagnet 4 and a return spring 4a for the plug, a cylindrical housing 3 for the safety valve 2, a flame detector thermocouple 5 applying an EMF for holding the electromagnet 4 through two electrical wires with their respective "line" terminal 6 and "ground" terminal 7. Both terminals 6,7 are fitted in a connector insulating body 10 for simultaneous plugging in (shown in detail in FIG. 3) . The connector 10 presents an internal cavity 10a for inserting the line terminal 6, while the ground terminal 7 is inserted into a surface recess 10b in the connector. Both terminals 6,7 are thus oriented in the radial direction for plugging into valve 2 that means traverse to the valve connection posts 8 and 9. The ground terminal is placed in a relative position closer to the valve 2 than the position of the line terminal 6.

[0009] Valve 2 has an elongated cylindrical shape and the housing 3 in the metal regulating tap of the gas appliance incorporates the valve seat 2b. Normally the axis 3a of the valve is oriented in the vertical direction, according to a height "H" of the space for the regulating tap in the cooker hob. A metal locknut 8 threaded to the end of the valve housing 3 forms the "ground" of the electromagnet 4 connection. The valve 2 has a metal post 9 connected to the wire of the electromagnet 4, extended outwards in the direction of the axis 3a, and standing beyond the height "H" of the locknut 6. An insulator 15 surrounds the ground post 9 insulating it from the locknut 8.

[0010] The metal locknut 8 has an outer contact sur-

face 8a transverse to the axis 3a of the valve, on which the ground terminal 7 makes contact. The "line" terminal 9 (FIG.2) is formed with an end in the form of a flat contact disc 9a and with a retaining groove 9b, wherein the line terminal 6 engages for its secure connection.

[0011] In reference to FIG. 1, 2 and 3, the thermocouple connector 10 comprises a moulded plastic body 10a-10f with a basically rectangular section and a flat profile. Both housings 10a and 10b in the body of the connector are insulated from each other by a spacing partition 10c, which has a central opening 10c' on one side for the passage of the cylindrical post 9. Both terminals, the line 6 and the ground 7, are fitted in their respective housings 10a, 10b in the connector body. The line terminal 6 is formed with two retaining lobes 11 between which the contact disc 9a and the post 9 retaining groove 9b are inserted. The inner face of the terminal 6 is flat for contact with the flat line disc 9a, while the outer terminal surface has a retaining cut-out 13 that is angled to prevent the accidental removal of the terminal and guided in a groove against a stop protuberance 10d at the bottom of the connector body 10.

[0012] In reference to FIG. 4A and FIG. 4B, a substantially flat-shaped ground terminal 7 is shown which presents an inner arch forming a U-bend with two lateral contact arms 14 and an open space between them encircling the valve post 9 without touching it. These lateral arms 14 are placed in contact via their front face 14a up against the flat surface 8a of the "ground" locknut.

[0013] To achieve a low electrical contact resistance, the contact arms 14 are urged against the locknut contact surface 8a. On its rear surface each arm 14 of the ground terminal 7 has a bent spring-like rib 18 guided in a longitudinal groove 23 on the front surface of said spacing partition 10C. The guiding ribs 18 facilitate the positioning of the ground terminal 7, centred in relation to the line terminal 6 insulated from each other. The contact arms 14 are located over the spacing partition 10c above the contact surface and they are urged up against the contact surface 8a by the spring rib 18 compressed in the guide groove 23.

[0014] Each contact arm 14 terminates in a bent tip 21 angled towards the rear face of the terminal 7, which stops the insertion of the terminal 7 against an end 10f of the connector body. In order to prevent its accidental removal out of the connector 10, the ground terminal 7 also presents a retaining salient shoulder 17, coming up against a projecting wall 10d in the connector body.

Claims

1. A combination of a flame detector thermocouple and a safety valve with an electrical connection (6-10), adapted to a gas cooking hob, comprising said safety valve (2) provided with a holding electromagnet housed in a metal conduit (3) in a gas tap of the cooking hob, said thermocouple (5,5a,5b) having two supply wires (6,7) fitted with a respective "line" terminal and "ground" terminal (7), and an electrical connection by which the two terminals (6,7) are plugged in to the valve (2), being oriented in a radial direction to a valve axis (3a), wherein a metal locknut (8) covering the housing conduit (3) forms a connecting surface (8a) for the ground terminal (7), and the connecting post (9) on the valve for the line terminal (6) has a substantially cylindrical shape, protruding in the axial direction beyond the locknut (8), **characterised in that** the thermocouple (5) is provided with a connector (10) for both terminals (6,7), which are inserted in a respective housing space (10a, 10b) in the insulating body (10a-10f) of the connector, and positioned therein parallel to and insulated from each other by means of a spacing insulating partition (10c), by which they are inserted in a radial direction relative to the axis (3a), making direct pressure contact against said valve line post (9) and against said ground locknut (8), and secured by respective retaining means (13, 17) with the cooperation of a respective abutment (10d,10e) in the connector body.

2. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein said locknut (8) for connecting the ground terminal (7) has an outer contact surface (8a), while the ground terminal (7) has a substantially flat front face (14a), urged up against said locknut contact surface (8a), being subdivided for this purpose into two lateral contact arms (14) which encircle said line post (9), both terminal arms (14) having on their rear face a spring rib (18) compressed elastically through being plugged into the connector (10).

3. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein the ground terminal (7) has a substantially flat front face (14a), subdivided into two lateral contact arms (14) encircling the line post (9) and insulated from it, whereby the ground terminal (7) is placed in a centred position in relation to the line post (9) and insulated from it, said lateral contact arms (14) being provided with a respective spring rib (18), guided by way of a corresponding longitudinal groove (23) in a surface in the connector body (10a-10f).

4. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein the line terminal (6) is inserted in contact with the cylindrical valve post (9) and the ground terminal (7) has a substantially flat front face pressed by an elastic force up against an outer contact surface (8a) on the locknut, and said retaining means (10d, 10e) of the two terminals (6, 7) in the connector body (10) comprise a respective projecting shoulder (13, 17) at each terminal (6, 7), coming up against a

respective salient wall (10d, 10e) belonging to the connector body (10a,10f).

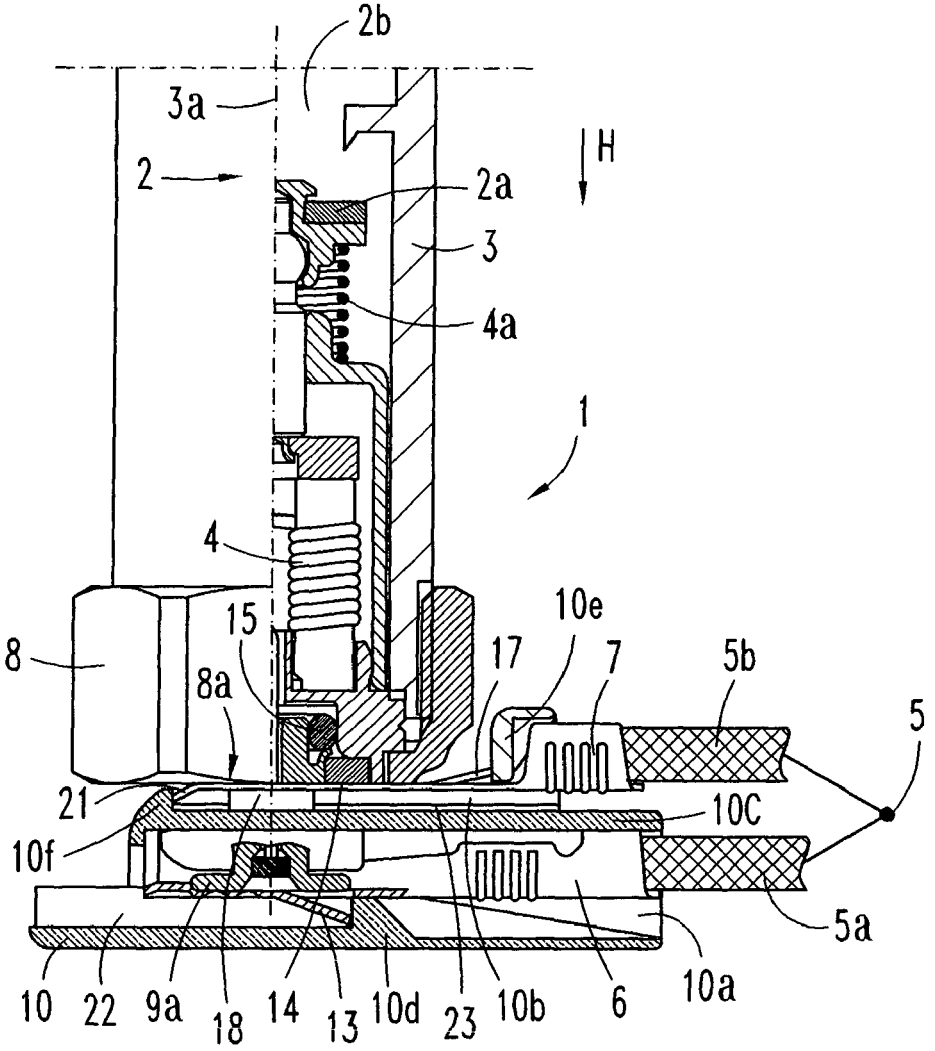
Amended claims in accordance with Rule 86(2) EPC.

1. A combination of a flame detector thermocouple and a safety valve with an electrical connection (6-10), adapted to a gas cooking hob, comprising said safety valve (2) provided with a holding electromagnet housed in a metal conduit (3) in a gas tap of the cooking hob, said thermocouple (5,5a,5b) having two supply wires (6,7) fitted with a respective "line" terminal and "ground" terminal (7), and an electrical connection by which the two terminals (6,7) are plugged in to the valve (2), being oriented in a direction relative to a valve axis (3a), wherein a metal locknut (8) arranged at the end of said housing conduit (3) forms a connecting surface (8a) for the ground terminal (7), and the connecting post (9) on the valve for the line terminal (6) has a substantially cylindrical shape, protruding in the axial direction beyond the locknut (8), **characterised in that** the thermocouple (5) is provided with a connector (10) having an insulating body (10a-10f) of the connector (10) for both terminals (6,7), which are plugged in a respective body housing space (10a, 10b), and positioned therein parallel to and insulated from each other by means of a spacing straight partition (10c) integrated in the single body (10a-10f), by which they are inserted in a radial direction relative to the axis (3a), making direct pressure contact against said valve line post (9) and against an outer front surface (8a) in said ground locknut (8), and secured by respective retaining means (13, 17) with the cooperation of a respective abutment (10d,10e) in the connector body (10a-10f).

2. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein said locknut (8) for connecting the ground terminal (7) has said outer contact surface (8a), while the ground terminal (7) has a substantially flat front face (14a), urged up against said locknut contact surface (8a), being subdivided for this purpose into two lateral contact arms (14) which encircle said line post (9), both terminal arms (14) having on their rear face a spring rib (18) compressed elastically through being plugged into the connector (10).

3. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein the ground terminal (7) has a substantially flat front face (14a), subdivided into two lateral contact arms (14) encircling the line post (9) and insulated from it, whereby the ground terminal (7) is placed in a centred position in relation to the line post (9) and insulated from it, said lateral contact arms (14) being provided with a respective spring rib (18), guided by way of a corresponding longitudinal groove (23) in a surface in the connector body (10a-10f).

4. The flame thermocouple and the safety valve with an electrical connection (6-10) according to claim 1, wherein the line terminal (6) is inserted in contact with the cylindrical valve post (9) and the ground terminal (7) has a substantially flat front face pressed by an elastic force up against an outer contact surface (8a) on the locknut, and said retaining means (10d, 10e) of the two terminals (6, 7) in the connector body (10) comprise a respective projecting shoulder (13, 17) at each terminal (6, 7), coming up against a respective salient wall (10d, 10e) belonging to the connector body (10a,10f).


2b
3a
H
2
2a
3
4a
1
4
15
10e
8
17
7
5b
5
8a
21
10C
10f
5a
10
22
9a
18
14
13
10d
23
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6
10a

FIG. 1

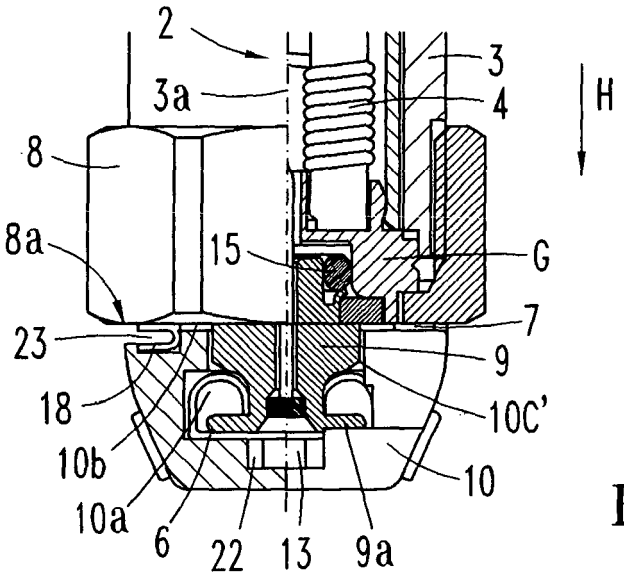

FIG. 2

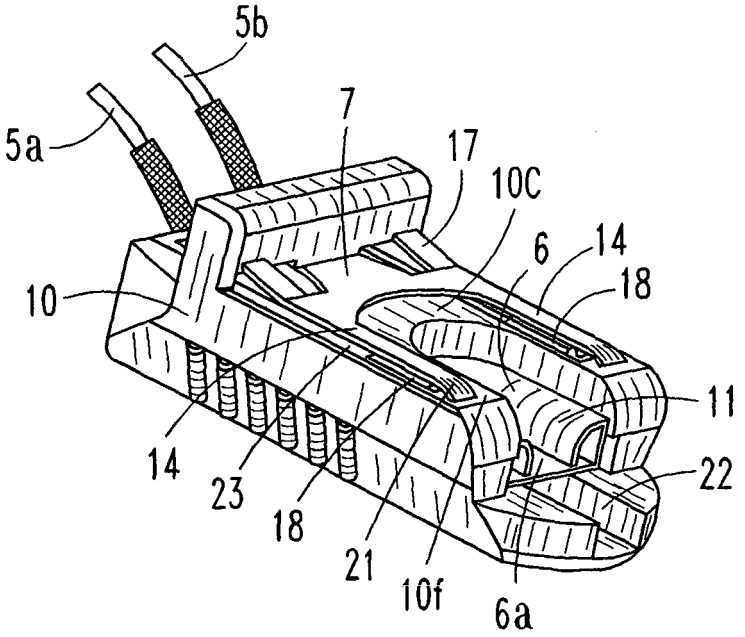

FIG. 3

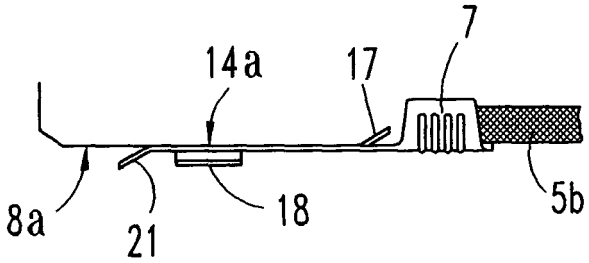

FIG. 4A

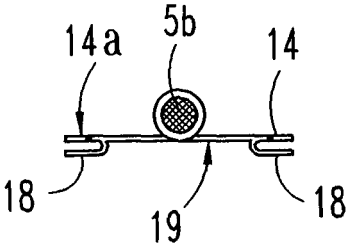

FIG. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 05 38 0046

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 July 2005	Gavriliu, C

CATEGORY OF CITED DOCUMENTS

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REFERENCES CITED IN THE DESCRIPTION

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- FR 2696531 A3 **[0003]**