US 20100055630A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2010/0055630 A1

(43) Pub. Date: Mar. 4, 2010

Pianezze et al.

(54) **GAS LIGHTING DEVICE FOR ELECTRIC HOUSEHOLD APPLIANCE, IN PARTICULAR A COOKING RANGE, HAVING A QUICK CONNECTION SYSTEM TO THE ELECTRODES**

(75) Inventors: **Daniele Pianezze**, Cassano Magnago (IT); **Massimo Aleardi**, Cassano Magnago (IT)

Correspondence Address:
LOWE, HAUPTMAN, HAM & BERNER, LLP (ITW)
1700 DIAGONAL ROAD, SUITE 300
ALEXANDRIA, VA 22314 (US)

(73) Assignee: **ITW INDUSTRIAL COMPONENTS S.R.L. CON UNICO SOCIO**, Milano (IT)

(21) Appl. No.: **12/529,322**

(22) PCT Filed: **Mar. 24, 2008**

(86) PCT No.: **PCT/IB2008/000683**

§ 371 (c)(1),
(2), (4) Date: **Aug. 31, 2009**

(30) **Foreign Application Priority Data**

Mar. 26, 2007 (IT) TO2007A000216

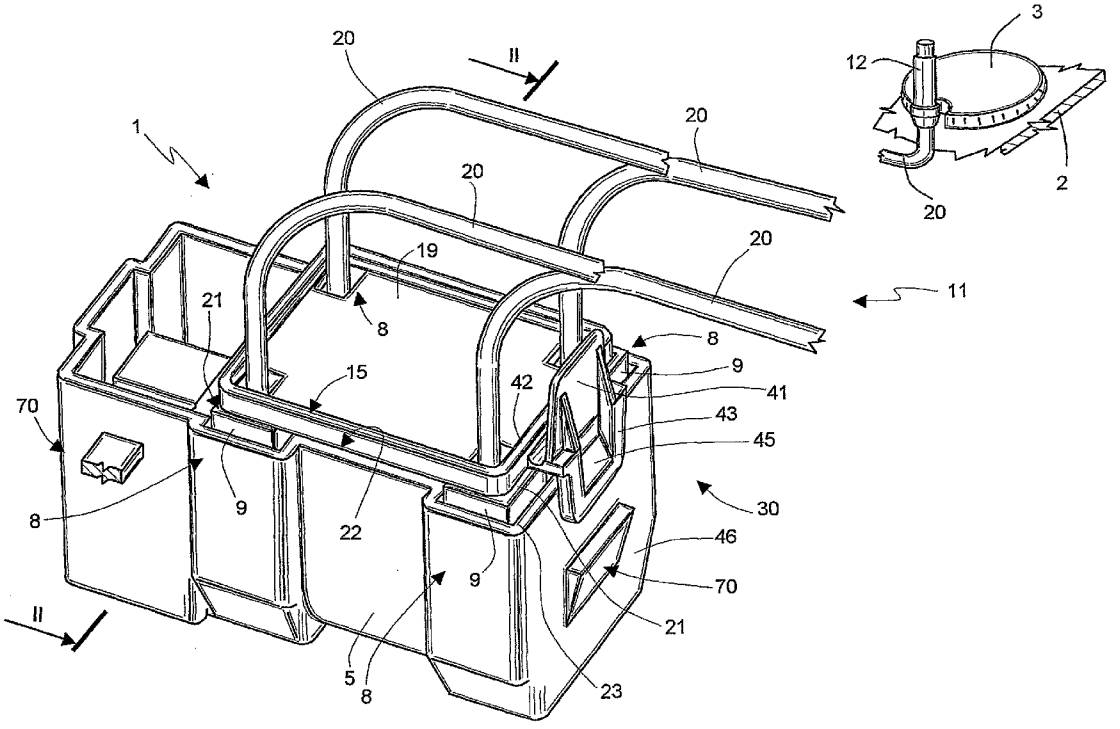
Publication Classification

(51) **Int. Cl.**
F23Q 3/00 (2006.01)

(52) **U.S. Cl.** **431/258**

(57) **ABSTRACT**

An electronic gas lighting device including: a cup-shaped casing, formed by an electrically insulating material; a plurality of high-voltage outputs carried by the casing and each including a chimney-like housing carried by the casing and also formed by an electrically insulating material and a first electric contact carried by the chimney-like housing and arranged therein; and a frame element integrally and protrudingly carrying, on a first face thereof intended in use to face towards the casing, a plurality of second contacts, in number equal to the high-voltage outputs present on the casing and adapted to couple with the first contacts within said chimney-like housings, and provided on a second face thereof, opposite to the first, with a plurality of electric wires each connecting a second contact with a spark generating electrode fastenable to a cooking range; snapping fastening means to the casing being peripherally arranged on the outside of the frame element, along at least one side of the same.



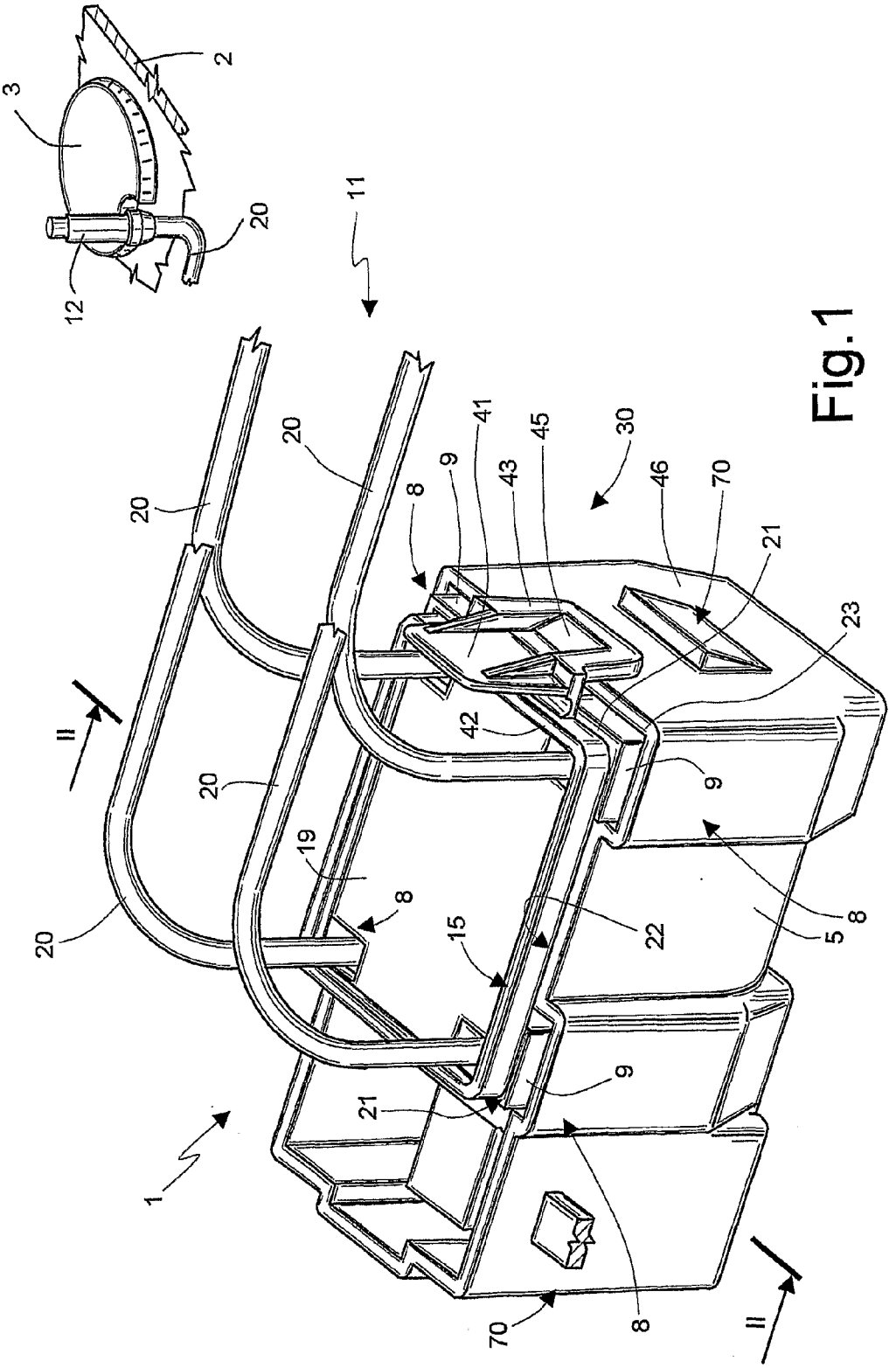

3
2
20
12
11
20
20
20
41
45
30
9
43
8
46
70
21
23
II
42
9
20
19
8
8
20
15
22
5
8
9
21
1
II
70
8

Fig.1

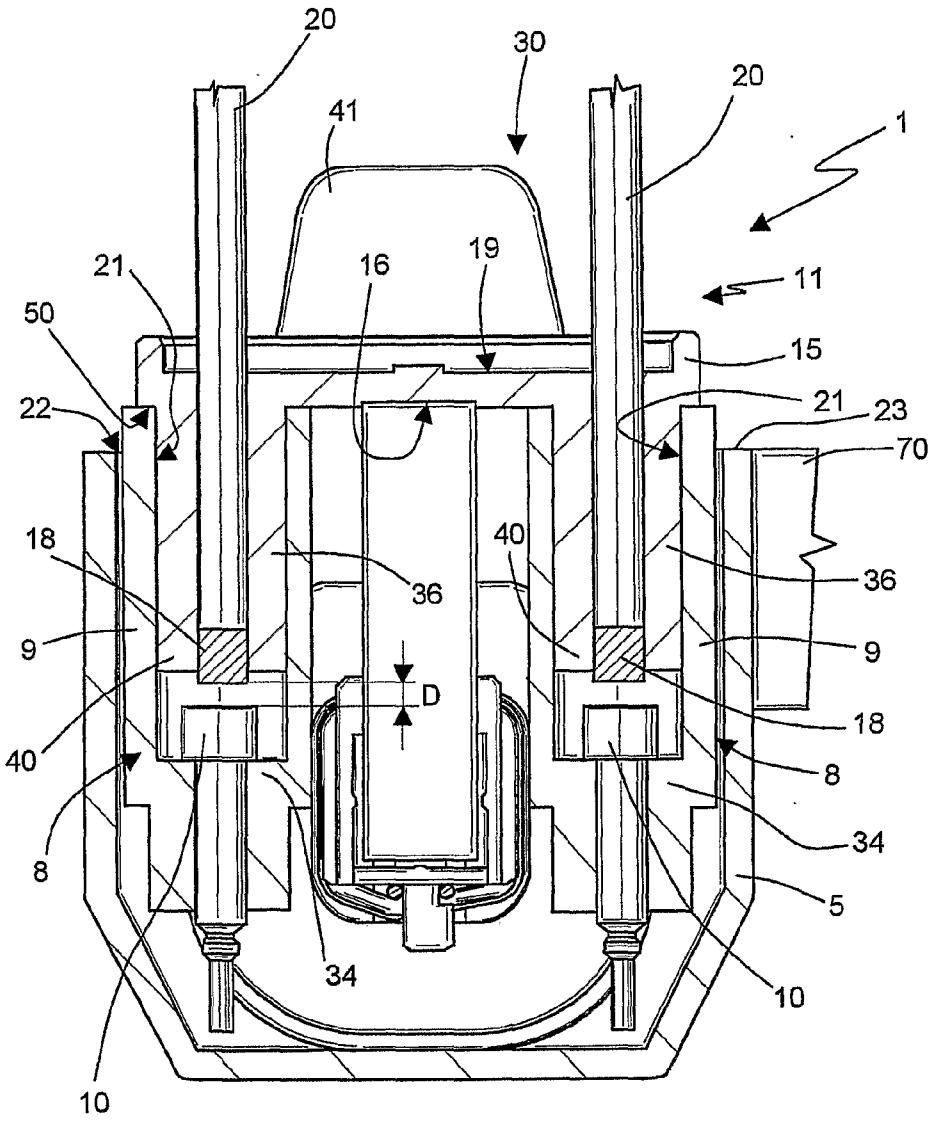

20
30
20
41
1
21
16
19
11
50
15
22
21
23
70
18
40
36
36
9
9
D
18
40
8
8
34
5
34
10
10

Fig.2

GAS LIGHTING DEVICE FOR ELECTRIC HOUSEHOLD APPLIANCE, IN PARTICULAR A COOKING RANGE, HAVING A QUICK CONNECTION SYSTEM TO THE ELECTRODES

TECHNICAL FIELD

[0001] The present invention relates to an electronic gas lighting device, of the type intended to equip an electric household appliance, such as for example a cooking range, for determining the controlled lighting of the burners by supplying a high voltage to electrodes fixable to the cooking range, provided with a quick connection device of the electrodes to the high-voltage outputs of the gas lighting device.

BACKGROUND ART

[0002] It is known from EP1101067B1, to the same Applicant, an electronic gas lighting device including a casing formed by electrically insulating material provided with a plurality of high-voltage outputs each defined by a chimney-like housing, integrally obtained with the casing and carrying a corresponding high-voltage contact therein, e.g. a male faston connector. In use, each contact in the chimney-like housings must be connected, by means of an electric wire, to a corresponding spark generating electrode, fixable to the cooking range at a burner. For this purpose, on one end, the electric wire is pre-wired, e.g. crimped or welded, to the electrode and, on the other end, is pre-wired in an identical manner to a female faston connector, which must then be inserted in use onto the male faston connector inside the chimney-like housing, so as to protect the electric connection with an electrically insulating element (indeed the chimney-like housing of the casing).

[0003] The above-described known device is more than satisfactory. However, the assembly times of the electric wires on the high-voltage outputs of the gas lighting devices are relatively long; furthermore, due to possible incorrect manoeuvres by the assembly operator, the male and female faston connectors may not be correctly coupled, causing even possible deformations of the same. For the same reason, the electric household appliance manufacturer cannot automatically assemble the wires onto the high-voltage outputs of the gas lighting device, because it would be essentially impossible to ensure the correct, simultaneous positioning of all male contacts with all female contacts.

DISCLOSURE OF INVENTION

[0004] It is thus the object of the present invention to improve the known gas lighting devices in the part relating to the electric connection of the electrodes to the gas lighting device, by providing a gas lighting device for an electric household appliance, in particular a cooking range, which is easily and rapidly connectable to the electrodes by means of electric supply wires, so as to avoid errors by the assembly operator, and to allow the electric household appliance manufacturer, if desired, to perform the assembly in an entirely automatic manner; this all guaranteeing low production and assembly costs, small sizes and high operating reliability.

[0005] The present invention thus relates to an electronic gas lighting device as defined in claim **1**.

[0006] The invention also relates to a high-voltage output quick connection device in an electronic gas lighting device with corresponding spark generating electrodes fastenable onto an electric household appliance, as defined in claim **9**.

[0007] In particular, the electronic gas lighting device according to the invention comprises a cup-shaped casing, formed by an electrically insulating material; a plurality of high-voltage outputs carried by the casing and each comprising a chimney-like housing carried by the casing and also formed by an electrically insulating material and a first electric contact carried by the chimney-like housing and arranged therein; and a frame element integrally and protrudingly carrying, on a first face thereof intended in use to face the casing, a plurality of second contacts, in number equal to the high-voltage outputs present on the casing and adapted to couple with the first contacts within said chimney-like housings; the frame element being further provided on a second face thereof, opposite to the first, with a plurality of electric wires each connecting a second contact with a spark generating electrode fastenable to the household appliance; and with snapping fastening means to the casing peripherally arranged on the outside of the frame element, along at least one side of the same.

[0008] Each chimney-like housing is provided with an open end for the reception of a corresponding second contact and carries therein a corresponding first contact mounted close to a bottom wall of the chimney-like housing, opposite to the open end, so as to remain away from the open end and well within the chimney-like housing.

[0009] Similarly, the frame element is integrally provided, on the first face thereof and for each second contact, with a longeron-shaped guide element adapted to slidingly couple, for the entire length thereof, within a corresponding chimney-like housing, through the open end of the same, to guide the second contact into electric coupling with the corresponding first contact arranged within the chimney-like housing.

[0010] In this manner, the frame element with the second contacts and the electric wires, already pre-wired to the second contacts and to the electrodes, forms a quick connection device of the electrodes to the high-voltage outputs providing as a whole a compact and cost-effective electronic gas lighting device mountable with extreme quickness and simplicity and in which it is not possible for the assembly operator to produce damages at the contacts, because the electric connection of the first contacts with the second ones is totally guided by the longeron-shaped guide elements which slidingly couple with the internal side wall of the chimney-like housings, besides ensuring a much firmer and more secure reciprocal mechanical connection of the first and the second contacts. Finally, this being a pre-wireable device for subassemblies later reciprocally coupled with a single simple movement (the casing with the chimney-like housings and containing the electronics on one side and the frame element with the electric wires and the second contacts on the other) it allows the manufacturer to provide an entirely automatic assembly cycle.

[0011] Finally, being the mechanical coupling part between the contacts entirely formed by non-conductive elements, such as the guide elements and the corresponding chimney-like housings, the contacts can be made in a non-traditional manner, e.g. as simple flat terminals, which are in use simply facing each other and arranged at a sufficiently small predetermined distance (thus not necessarily in reciprocal contact) into an insulated environment formed by the chimney-like housings. The aforesaid contacts, indeed, being high-voltage

contacts, may transmit electric current in the form of discharge with perforation of the dielectric constituted by the air between the facing contacts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Further features and advantages of the invention will be apparent from the following description of a non-limitative embodiment thereof, with reference to the figures in the accompanying drawings, wherein:

[0013] FIG. **1** shows a front three-quarter perspective view of an electronic gas lighter device made according to the invention, and shown in a use configuration; and

[0014] FIG. **2** shows on enlarged scale a section elevation view taken along a plotting plane II-II of the gas lighting device in FIG. **1**.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] With reference to FIGS. **1** and **2**, numeral **1** indicates as a whole a gas lighting device for an electric household appliance, a cooking range **2** in this non-limiting illustrated embodiment, provided with a plurality of burners **3** (only one of which is shown for the sake of simplicity); the device **1** comprises a cup-shaped casing **5**, formed by an electrically insulating material, e.g. by moulding of a synthetic plastic material, and a plurality of high-voltage outputs **8** carried by the casing **5** and each comprising (FIG. **2**) a chimney-like housing **9** carried by the casing **5** and also formed by an electrically insulating material and an electric contact **10** carried by the chimney-like housing **9** and arranged therein.

[0016] The gas lighting device **1** further comprises a quick connection device **11** of the high-voltage outputs **8** of the casing **5** to corresponding spark generating electrodes **12**, also belonging to the gas lighting device **1** as a whole and fixable in use in a known manner, each close to a corresponding burner **3** on the cooking range **2** in order to be able to control the lighting in a known manner.

[0017] The device **11** comprises a frame element **15** integrally and protrudingly carrying, on a first face **16** thereof (FIG. **2**) intended in use to face the casing **5**, a plurality of second contacts **18**, in number equal to the high-voltage outputs **8** present on the casing **5** and adapted to couple with contacts **10** inside the chimney-like housings **9**. The frame element **15** is further provided, on a second face **19** thereof, opposite to the face **16**, with a plurality of electric wires **20** each connecting a contact **18** with a spark generating electrode **12**.

[0018] In the non-limiting embodiment shown, the chimney-like housings **9** are made as a non-integral part of the casing **5**, but instead are independent elements, arranged at least in part within the casing **5** (in which they are embedded and blocked in use by means of resining) and so as to overhangingly protrude, with corresponding open ends **21** thereof, through a mouth **22** of the cup-shaped casing **5**, but only immediately over a peripheral edge **23** of the mouth **22**; in such a case, the frame element **15** is defined by a plate-shaped lid adapted to couple by resting on the open ends **21** protruding from the mouth **22** to close the same and essentially cover the mouth **22**, so as to protect the resining underneath which fills the casing **5** in use.

[0019] It is however apparent that the foregoing and the following description is perfectly applicable also to a casing **5** of a more traditional type, in which the chimney-like housings **9** are integrally obtained in one piece with the casing **5** and protrude from the same from a side opposite to the mouth **22**.

[0020] However, the quick connection device **11** is completed by snapping fastening means **30** of the frame element **15** to the casing **5** peripherally arranged on the outside of the frame element **15**, along at least one side of the same.

[0021] In particular, the open end **21** of each chimney-like housing **9** allows the reception in the same of a corresponding contact **18** for coupling with the contact **10**, because the latter is mounted close to (onto, in this case) a bottom wall **34** (FIG. **2**) of the chimney-like housing **9**, opposite to the open end **21**, so as to remain away from the open end **21** and well within the chimney-like housing **9**.

[0022] According to an important aspect of the invention, the frame element **15** is integrally provided on the face **16** and perpendicularly protrudingly with respect to the same, for each existing contact **18**, with a longeron-shaped guide element **26** (FIG. **2**) adapted to slidingly couple, for the entire length thereof, within a corresponding chimney-like housing **9**, through the open end **21** of the same, to guide the contact **18** it carries into electric coupling with the corresponding contact **10** arranged within the chimney-like housing **9**.

[0023] In particular, the frame element **15** and the guide elements **36** are formed in a one-piece single part by moulding an electrically non-conducting material, in this case a synthetic plastic material; the contacts **18** are also carried by, and embedded at least in part in, the guide elements **36**, so as to be protrudingly carried with respect to the face **16**, each at a free end **40** (FIG. **2**) of a corresponding guide element **36**.

[0024] The contacts **18** are further fastened and connected in a pre-wired manner with the spark generating electrodes **12** by means of the electric wires **20**, the opposite ends of which are electrically and mechanically connected, in a pre-wired manner, to the contacts **18** on one side and to the electrodes **12** on the other, e.g. by crimping or soldering. In this case, the ends of the wires **20** are, on the end of the contacts **18** (i.e. on the opposite side of the electrodes **12**), also at least in part embedded in the longeron-shaped guide elements **36** along with the contacts **18**.

[0025] The guiding elements **36** are shaped so as to display a peripheral profile mating with the inner peripheral profile of the chimney-like housings **9**, so that the outer side surfaces thereof cooperate in use with the inner side surfaces of the chimney-like elements **9**; in this manner, a firm mechanical coupling is obtained between casing **5** and frame element **15** already with the simple insertion of the longeron-shaped elements **36** in the housings **9** arranged for them, coupling later completed by the fastening means **30**.

[0026] However, in virtue of the described conformation of the guide elements **36** and the chimney-like housings **9**, the snapping fastening means **30** to the casing **5** may be simplified and consisting of a single elastic fin **41** (instead of, for example, of a plurality of fins) arranged on one single side **42** of the frame element **15**, between a pair of guide elements **36**, overhangingly protruding from the frame element **15** with respect to both faces **16** and **19**, perpendicularly to the same and provided towards the casing **5** with a fastening end **43**, in this case slot-shaped, adapted to snappingly couple with a corresponding peg **45**, in this case tooth-shaped, integrally obtained with the casing **5** on a side wall **46** of the same.

[0027] According to a further preferred aspect of the invention, the contacts **10** are defined by corresponding flat terminals carried just at the bottom walls **34** of the chimney-like

housings **9**, parallelly to the same and, similarly, the contacts **18** are also defined by corresponding flat terminals (diagrammatically indicated by a dashed line) of size either equal to or lower than that of the flat terminals defining the contacts **10**, directly carried at the free ends **40** of the longeron-shaped guide elements **36**, intended in use to face the bottom walls **34** of the chimney-like housings **9**, as shown in FIG. **2**.

[0028] In particular, with reference to such a figure, the frame element **15** is provided with abutting means **50** cooperating with the casing **5** (in this case, with the peripheral edge **23** delimiting the mouth **22**) for positioning the contacts **18** with the corresponding ends **40** at a distance D predetermined by the contacts **10** with the corresponding bottom walls **34**, and facing the latter.

[0029] The described gas lighting device **1** is completed by known snapping fastening means **70** to the cooking range **2**, shown only in part for simplicity.

[0030] In such a manner, it is not necessary in use to mechanically couple the contacts **10** with the contacts **18**, and therefore it is no longer even necessary to make the same as male and female, respectively. The mechanical coupling is indeed already ensured by the frame element **15** with the longeron-shaped guide elements **36** thereof, which couple with the chimney-shaped housings **9**, coupling which can be made with greater accuracy than a coupling between traditional contacts of the faston-type and which does not require a great positioning accuracy because it is essentially self-positioning. On the other hand, the positioning of the contacts **10** simply close to the contacts **18**, without even needing a direct physical contact, being high-voltage operating contacts, however allows the necessary passage of electric current for supplying the sparking on the electrodes **12**, also because the current passage occurs in a closed and insulated environment, delimited between the bottom walls **34**, the ends **40** and the side walls of the housings **9**.

1. An electronic gas lighting device for an electric household appliance, in particular a cooking range, of the type comprising: a cup-shaped casing, formed by an electrically insulating material; and a plurality of high-voltage outputs carried by the casing and each comprising a chimney-like housing carried by the casing and also formed by an electrically insulating material and a first electric contact carried by the chimney-like housing and arranged therein; characterised in that said device further comprises a frame element integrally and protrudingly carrying, on a first face thereof intended in use to face the casing, a plurality of second contacts, in number equal to the high-voltage outputs present on the casing and adapted to couple with the first contacts within said chimney-like housings; the frame element being further provided on a second face thereof, opposite to the first, with a plurality of electric wires each connecting a second contact with a spark generating electrode fastenable to the household appliance; and with snapping fastening means to the casing peripherally arranged on the outside of the frame element, along at least one side of the same.

2. A device according to claim **1**, characterised in that said chimney-like housings are arranged at least in part within said casing and so as to protrude, with the corresponding ends thereof, overhangingly through a mouth of the cup-shaped casing, but only to immediately over a peripheral edge of said mouth; said frame element being defined by a plate-shaped lid adapted to couple by resting on said open ends protruding from the mouth to close the same and essentially cover said mouth.

3. A device according to claim **1**, characterised in that each said chimney-like housing is provided with an open end for the reception of a corresponding second contact and internally carries therein a corresponding first contact mounted close to a bottom wall of the chimney-like housing, opposite to said open end, so as to remain away from the open end and well within the chimney-like housing.

4. A device according to claim **3**, characterised in that said frame element is integrally provided on said first face and for each second contact with a longeron-shaped guide element adapted to slidingly couple, for the entire length thereof, within a corresponding said chimney-like housing, through the open end of the same, to guide the second contact into electric coupling with the corresponding first contact arranged within the chimney-like housing.

5. A device according to claim **4**, characterised in that said frame element and said guide elements for the second contacts are formed in a single one-piece part by moulding an electrically insulating material; said second contacts being carried embedded at least in part within said guide elements.

6. A device according to claim **4**, characterised in that said snapping fastening means to the casing consist of a single elastic fin arranged on one side of the frame element, between a pair of said guide elements for the second contacts, overhangingly protruding from the frame element with respect to both said first and second face of the frame element, perpendicularly to the same and provided towards the casing with a fastening end adapted to snappingly couple with a corresponding peg integrally obtained on a side wall of the same.

7. A device according to claim **4**, characterised in that said first contacts are defined by corresponding first flat terminals carried just at the bottom walls of the chimney-like housings, parallelly to the same; said second contacts being defined by corresponding second flat terminals, of size either equal to or lower than that of the first flat terminals, directly carried at respective free ends of the longeron-shaped guide elements of the frame element, intended in use to face said bottom walls of the chimney-like housings.

8. A device according to claim **7**, characterised in that the frame element is provided with abutting means cooperating with the casing for positioning the second contacts at a predetermined distance from the first contacts, but facing the latter.

9. A high-voltage output quick connection device in an electronic gas lighting device with corresponding spark generating electrodes fastenable onto an electric household appliance, characterised in that it comprises a frame element integrally and protrudingly carrying, on a first face thereof intended in use to face a casing of the gas lighting device, a plurality of contacts, in number equal to the high-voltage outputs present on the casing and on a second face thereof, opposite to the first, a plurality of electric wires each connecting in a pre-wired manner one of said contacts with one of said spark generating electrodes.

10. A device according to claim **9**, characterised in that said frame element is integrally provided, on said first face and for each said contact, with a longeron-shaped guide element adapted to slidingly couple, for its entire length, within a corresponding chimney-like housing of the casing of the gas lighting device defining a corresponding said high-voltage output; each contact being carried by a free end of a corresponding guide element, at least in part embedded within the

same along with an end of said electric wire, opposite to the corresponding electrode, fastened and pre-wired to the contact.

11. A device according to claim **9**, characterised in that said frame element and said longeron-like guide elements are formed in a single one-piece part by moulding an electrically non-conducting material, preferably formed by a synthetic plastic material.

* * * * *