

Description

This invention relates to a handy burner device for use in the fields of metalworks, the manufacture of artificial teeth, hobbies and the like, having the features as recited in the generic part of claim 1.

A burner device of this kind is disclosed in the US-A-4,419,072. This prior art burner has a ring-shaped air adjuster which is movable along the fuel gas passage by operation of a lever *independently* of the operation of the ignition device. So the user has to adjust the air flow separately by hand *before and after* the operation of the ignition device.

The FR-A-1,587,972 discloses a burner which has also a ring-shaped air adjuster which is freely movable along and also rotatable around the fuel gas passage. However, the rotation does not have any effect on the air supply rate because the effective cross sectional area of the air inlet port is only adjustable by longitudinal movement of the ring. Moreover the operating member of the ignition device is not connected to the ring, but the ring is displaced by hands or by gravity (by turning the burner with its nozzle downwards) or by inertia forces when a mass slides within the tubular housing of the burner upon operation of the ignition device. In any case the ring does not take nor maintain a definite, reproducible position. Especially during handling of the burner the ring may slide unintentionally along the fuel passage. So operation of this burner is still more complicated than operation of the torch disclosed in the US-A-4,419,072.

The FR-A-1,172,860 discloses a burner having a nozzle head fitted into a nozzle tip at the extreme end of a nozzle pipe in order to form a passage into a main passage and a sub-passage. However, an air inflow control member is not disclosed therein.

It is an object of the present invention to provide a controllable handy burner device which in combination can easily and reliably be ignited, which an intake quantity of air necessary for combustion can be also adjusted, and even the heating power can be adjusted.

To achieve the above-described object the present invention comprises a burner having the features recited in claim 1.

In contrast to the prior art burners the burner according to the present invention has an air control cylinder which is

a) connected to the operating member of the ignition device,

b) under the permanent action of a spring, and

c) able to adjust the air flow by longitudinal movement *as well as by rotation*.

This results in the following advantages:

a) During ignition the air inlet is positively open. There is no necessity to make an pre-adjustment. The cylinder takes a preset position whenever the ignition device is operated.

b) The spring assures that the cylinder keeps the position in which it is rotated or shifted,

independently of the orientation or movement of the burner.

c) It is possible to adjust the air flow while the flame is burning without changing the ignition conditions.

Preferably the combustion device is provided with a main passage and a sub-passage located at the extreme end of a nozzle tube having an air intake hole, said air intake hole capable of being adjusted by an air adjusting cylinder rotatably and retractably provided in the periphery of the nozzle tube, said air adjusting cylinder being associated with an operating plate of the ignition device so that said cylinder can be operatively connected to the ignition device to open the air intake hole.

The aforesaid ignition device is composed of a piezo electronic unit, which is designed so that the piezo electronic unit is shocked and operated by a movable member which moves along with the aforesaid operating plate to generate a discharge spark between a discharge electrode provided on the extreme end of the nozzle tube and a nozzle head to ignite gas emitted from the sub-passage, and said ignition is propagated to the main passage to generate a burning flame.

Various devices are provided as described above. According to the burner device of the present invention, the aforesaid ignition device can be merely operated in a state wherein fuel gas is supplied to the combustion device to securely effect the ignition and combustion of fuel gas without employing other special means. In addition, such combustion can be continued unless a supply of fuel gas is stopped even if the ignition device is returned to its original mode.

The present invention will now be described in detail by way of embodiments shown in the accompanying drawings.

Brief description of the drawings

Fig. 1 is a perspective view of a burner device in accordance with the present invention.

Fig. 2 is a cross sectional plan view showing an upper portion of the burner device.

Fig. 3 is a longitudinal front view taken on line III—III of Fig. 1.

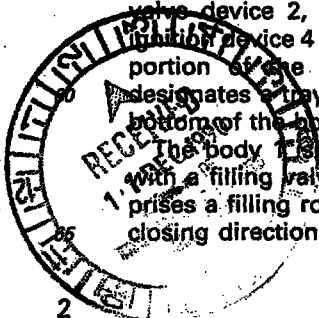
Fig. 4 is a longitudinal sectional side view taken on line IV—IV of Fig. 1.

Fig. 5 is likewise a longitudinal sectional side view similar to Fig. 1 when ignition operation is effected.

Detailed description of the invention

A burner device, which is the size capable being gripped, comprises a cylindrical body 1 which also serves as a fuel tank, and devices including a valve device 2, a combustion device 3 and an ignition device 4 which are connected to an upper portion of the body 1. Reference numeral 5 designates a tray-like plate rotatably fitted in the bottom of the body.

The body 1 is provided at its bottom plate 1a with a filling valve 11. This filling valve 11 comprises a filling rod 13 normally biased in a valve closing direction by means of a spring 12 and a



valve body 14, and further comprises a fuel conduit 16 in the form of a long shaft supporting impregnant 15 filled in the upper portion within the body 1 and an exhaust pipe 18 arranged in the periphery of the conduit 16 leaving a predetermined clearance 17, so that when the body 1 is inverted to fill with liquefied gas fuel 19 and a liquid level reaches an open end of the exhaust pipe 18 to make it impossible to discharge gas within the body, further fuel cannot be filled.

A fuel supply pipe indicated at 20 has an upper end 20b provided within the body extending through an upper plate 1b of the body 1, and has a U-shaped pipe 20a provided at the lower end to be directed upwardly so as to prevent fuel dropping along the side of the fuel supply pipe 20 from flowing into the supply pipe in the form of liquid.

Connected to the upper end 20b projected from the upper plate 1b onto the body is a connecting member 21 between the body 1 and the valve device 2, and fuel within the body is supplied to the valve device 2 through a passage 22 interiorly of the connecting member 21.

The valve device 2 is provided on the upper portion of the body with a fixing member 23 mounted at a right angle, on a casing 41 of the ignition device 4 secured to the upper plate 1b of the body 1 along with the connecting member 21.

The fixing member 23 is formed at both ends with threads, and a flow control member 25 having at its extreme end a passage 24 in communication with the aforesaid passage 22 is inserted into the fixing member so that the member 25 may be rotated up to a valve seat 22a bored in a passage 26. This flow control member 25 comprises an O-ring 25a to impede fuel from flowing out in thereabout, threads 25b meshed with threads on the open inner side of the fixing member 23, and a flange 25d in contact with a nut-like stopper 25c threadably mounted on the end of the fixing member 23.

A porous and resilient fuel control member 27 is interposed between the flow control member 25 and the valve seat 22a, and the fuel control member 27 can be compressed by rotation of the flow control member 25 to control the flow rate of gaseous fuel from the body 1.

A needle valve 28 for opening and closing the passage 26 is rotatably inserted into the fixing member 23, and a handle 29 is mounted on the outer end of the needle valve by means of a screw 29a. The needle valve 28 is peripherally formed with an O-ring 28a and threads 28b similar to the flow control member 25, and a nut-like stopper 28c in contact with the threads 28b is screwed into the end of the fixing member 23.

A nozzle pipe supporting member 30 of the combustion device 3 is connected in the form of a T-letter to the center on the side of the fixing chamber 23, that is, to a portion wherein the upper surface of a casing 41 of the ignition device 4 is positioned. This supporting member 30 comprises a cylindrical body, in which a projected portion 30a in the center at the rear end bored with a passage is inserted into and integrally

mounted in a hole on the side of the fixing member 23 so that the projected portion 30a may face to the extreme end of the needle valve 28.

The supporting member 30 is also secured to the casing 41. A rear end of the nozzle pipe 31 is screwed into the supporting member 30 from an opening at the end thereof to an internal side of the projected portion 30a into which a filter 30b is inserted. An air control cylinder 32 integrally formed with a handle is rotatably and axially movably fitted in the periphery of the nozzle pipe 31. The air control cylinder 32 is formed with a cut-in portion 32a for opening and closing an air intake hole 31a bored in the side of the nozzle pipe 31, and the air control cylinder 32 is biased against the extreme end of the supporting member 30 by means of a coiled spring 34 interposed over and between a shoulder formed frontwardly on the side of the nozzle pipe 31 and the extreme end of the air control cylinder 32.

Within the rear end of the nozzle pipe 31, an orifice having a diameter of 0.1 mm in a perforated plate 33a fixed by a threaded pipe 33 is provided closely to the air intake hole 31a. A nozzle tip 36 along with a tip cover 39 is mounted on the extreme end of the nozzle pipe 31. A nozzle head 37 forming a nozzle orifice is fitted into the extreme end of the nozzle tip 36. A spline groove is formed in the periphery at the rear of the nozzle head 37, and a rear portion thereof is fitted into a receptacle at the tip end to form the head and tip together and a part of a passage 38 is branched in the periphery of the head to form a main passage 38a and a sub-passage 38b.

The tip cover 39 is interiorly provided with an electrode base 40 parallel with the nozzle head 37, and in this electrode base 40 formed of an insulating material, a discharge electrode 46 formed of an insulating material is secured toward the extreme end of the nozzle head 37.

The aforesaid ignition device 4 comprises a piezo electronic unit 43 having the same construction as that of a piezo electronic generator used for a gas lighter or the like. This piezo electronic unit has a piezo electronic element within a fixing member 43a, and a shock is applied to the piezo electronic element by a hammer operated by a movable member 44 to generate a high electric current.

The piezo electronic unit 43 is accommodated into the casing 41 with the movable member 44 directed outwardly and fixed by means of a screw or the like. A pusher 42 which extends through the side wall of the casing is mounted on the movable member 44, and a lead wire 45 is connected to the discharge electrode 46.

An operating plate 42a, which moves along with the movable member 44 along the upper wall of the casing 41, is mounted between the movable member 44 and the pusher 42, and the extreme end of the operating plate 42a is in contact with the handle of the air control cylinder 32.

The nozzle head 37 is electrically connected to the piezo electronic unit 43 through the casing 41,

the nozzle pipe supporting member 30, the nozzle pipe 31 and the nozzle tip 36, and a discharge spark is generated between the discharge electrode 46 and the nozzle head 37.

With the above-described construction, in the burner device, when the handle 29 is turned to open the passage 26 being closed by the needle valve 28 and thereafter the pusher of the piezo electronic unit 43 is pressed inwardly by the finger-tip, a discharge spark is generated between the discharge electrode 46 and the nozzle head 37 by operation of the piezo electronic unit 43. The thus generated spark ignites gaseous fuel emitted from the sub-passage 38b and the aforesaid ignition propagates to fuel emitted from the main passage 38a.

As the movable member 44 moves, the operating plate 42a also moves whereby the air control cylinder 32 in contact with the extreme end thereof is moved forward against the coiled spring 34. This movement causes the air intake hole 31a of the nozzle pipe 31 to open even if it is blocked by the air control cylinder 32 to let air flow into the nozzle pipe 31. This entry of air causes to form a mixture of fuel and air, and the combustion resulting from discharge is turned into a violent flame of high temperature, 1,300°C.

After the ignition, the piezo electronic unit 43 is returned to a state prior to operation by releasing a pressing force against the pusher 42 but the combustion continues unless the passage 26 is closed by the needle valve 28. Since the operating plate 42a returns along with the movable member 44, the air control cylinder 32 is also pushed back by the coiled spring 34, and the air intake hole 31a is blocked according to the position of the cut-in 32a. In this case, however, the air control cylinder 32 may be turned to register the cut-in 32a with the air intake hole 31a. An intake quantity of air can be adjusted by such registration.

Moreover, fuel controlled in quantity by the control member 27 can be secondarily controlled according to the opening degree of the needle valve, and combustion temperature can be suitably controlled by adjustment of these parts noted above.

Claims

1. A burner device comprising a fuel tank and body having a size capable of being gripped by hand, and a valve device, a combustion device and an ignition device which are connected to an upper portion of said body; said valve device having a passage to which fuel is supplied from said body, said passage being provided with an opening and closing element; said combustion device comprising a nozzle supporting member connected to the valve device and in communication with the passage, a nozzle pipe whose rear end is connected to said nozzle supporting member and bored with an air intake hole opened and closed by an air control cylinder retractably fitted and a nozzle head at the extreme end of said nozzle pipe and said ignition device comprising a

piezo electronic unit within a casing connected to the body, and an operating member of said piezo electronic unit said ignition device being electrically connected to a discharge electrode provided at the end of the combustion device and being directed at said nozzle head, characterized in that the air control cylinder (32) is operatively connected to the operating member (42) of the piezo electronic unit (43) and is also rotatably fitted and is provided with an opening or cut-in portion (32a) which can be brought into registry with the air intake hole (31a) and which permits a coiled spring (34) to act when retracted.

2. The burner device according to claim 1 wherein the valve passage is provided with a control member (27) varied by a flow control member (25) and a needle valve (28) used as the said opening and closing member, the nozzle supporting member (30) is connected to the side of the valve device (2), the nozzle head (37) is fitted into a nozzle tip (36) at the extreme end of the nozzle pipe (31) to form a passage (38) into a main passage (38a) and a sub-passage (38b), and the ignition device (4) comprises an operating member (42) which is moved along with a movable member (42a) of the piezo electronic unit (43) to move forward the air control cylinder (32).

3. The burner device according to claim 1, wherein said body (1) is interiorly provided with a fuel filling valve (11), and a fuel supply pipe (20) whose upper end (20b) extends through an upper plate (1b) of the body (1) and having an upwardly-directed U-shaped pipe (20a) mounted on a lower end thereof.

4. The burner device according to claim 3, wherein said valve device (2) is secured to the body (1) through a connecting member (21) at the upper end (20b) of said fuel supply pipe (20) and positioned at a right angle on a casing (41) of the ignition device (4) on the body (1).

5. The burner device according to claim 2, wherein said movable member (42a) of said piezo electronic unit (43) has a pusher (42) positioned externally of the casing (41).

6. The burner device according to claim 2, wherein said nozzle tip (36) has a tip cover (39), in which an electrode base (40) is provided and the discharge electrode (46) is provided on said electrode base (40).

7. The burner device according to claim 1, wherein the nozzle head (37) has a spline groove in the periphery at the rear thereof for fitting into said nozzle tip (36).

Patentansprüche

1. Brennvorrichtung mit einem Brennstoff-tank und mit einem Rumpf in einer Größe, dass er von Hand ergriffen werden kann, und mit einer Ventilanordnung, mit einer Verbrennungsvorrichtung und mit einer Zündvorrichtung, welche im oberen Bereich des Rumpfes angebracht sind; die Ventilanordnung weist einen Kanal auf, in welchen aus dem Rumpf Brennstoff eingespeist wird, wobei dieser Kanal mit einem Öffnungs-

the nozzle pipe supporting member 30, the nozzle pipe 31 and the nozzle tip 36, and a discharge spark is generated between the discharge electrode 46 and the nozzle head 37.

With the above-described construction, in the burner device, when the handle 29 is turned to open the passage 26 being closed by the needle valve 28 and thereafter the pusher of the piezo electronic unit 43 is pressed inwardly by the finger-tip, a discharge spark is generated between the discharge electrode 46 and the nozzle head 37 by operation of the piezo electronic unit 43. The thus generated spark ignites gaseous fuel emitted from the sub-passage 38b and the aforesaid ignition propagates to fuel emitted from the main passage 38a.

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After the ignition, the piezo electronic unit 43 is returned to a state prior to operation by releasing a pressing force against the pusher 42 but the combustion continues unless the passage 26 is closed by the needle valve 28. Since the operating plate 42a returns along with the movable member 44, the air control cylinder 32 is also pushed back by the coiled spring 34, and the air intake hole 31a is blocked according to the position of the cut-in 32a. In this case, however, the air control cylinder 32 may be turned to register the cut-in 32a with the air intake hole 31a. An intake quantity of air can be adjusted by such registration.

Moreover, fuel controlled in quantity by the control member 27 can be secondarily controlled according to the opening degree of the needle valve, and combustion temperature can be suitably controlled by adjustment of these parts noted above.

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2. The burner device according to claim 1 wherein the valve passage is provided with a control member (27) varied by a flow control member (25) and a needle valve (28) used as the said opening and closing member, the nozzle supporting member (30) is connected to the side of the valve device (2), the nozzle head (37) is fitted into a nozzle tip (36) at the extreme end of the nozzle pipe (31) to form a passage (38) into a main passage (38a) and a sub-passage (38b), and the ignition device (4) comprises an operating member (42) which is moved along with a movable member (42a) of the piezo electronic unit (43) to move forward the air control cylinder (32).

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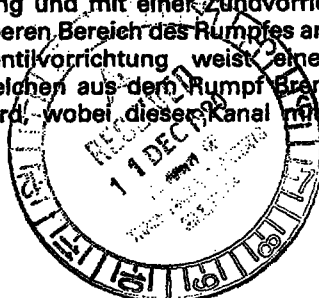
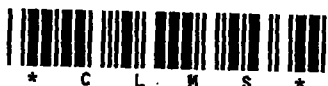
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6. The burner device according to claim 2, wherein said nozzle tip (36) has a tip cover (39), in which an electrode base (40) is provided and the discharge electrode (46) is provided on said electrode base (40).

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Patentansprüche

1. Brennvorrichtung mit einem Brennstoff-tank und mit einem Rumpf in einer Größe, dass er von Hand ergriffen werden kann, und mit einer Ventilanordnung, mit einer Verbrennungsvorrichtung und mit einer Zündvorrichtung, welche im oberen Bereich des Rumpfes angebracht sind; die Ventilanordnung weist einen Kanal auf, in welchen aus dem Rumpf Brennstoff eingespeist wird, wobei dieser Kanal mit einem Öffnungs-



und Schließelement versehen ist; die Verbrennungsvorrichtung weist eine mit der Ventilvorrichtung verbundene und mit dem Kanal in Verbindung stehenden Düsenhalterung, ein Düsenrohr, dessen rückwärtiges Ende mit der Düsenhalterung verbunden und zur Bildung einer Lufteintrittsöffnung durchbohrt ist und durch einen zurückziehbar montierten Luftsteuerzylinder geöffnet und geschlossen wird, sowie einen Düsenkopf am äußersten Ende des Düsenrohres auf; bei Zündvorrichtung umfaßt eine piezoelektrische Einheit innerhalb eines mit dem Rumpf verbundenen Gehäuses sowie ein Bedienungsteil der piezoelektrischen Einheit, und die Zündvorrichtung ist elektrisch mit einer am Ende der Brennvorrichtung vorgesehenen und zum Düsenkopf gerichteten Sprühelektrode verbunden, dadurch gekennzeichnet, dass der Luftsteuerzylinder zu seiner Betätigung mit dem Bedienungsteil (42) der piezoelektrischen Einheit (42) verbunden und darüberhinaus verdrehbar montiert und mit einer Öffnung oder einer Aussparung (32a) versehen ist, welche über die Lufteintrittsöffnung (31a) gebracht werden kann, und dass der Luftsteuerzylinder (32) gegen die Wirkung einer Wendelfeder (34) von der Lufteintrittsöffnung zurückziehbar ist.

2. Brennvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass der Ventilkanal mit einem durch ein Durchflußsteuerglied (25) veränderbaren Stellglied (27) versehen ist und dass als Öffnungs- und Schließelement ein Nadelventil (28) vorgesehen ist, dass die Düsenhalterung (30) an der Seite der Ventilvorrichtung (2) angebracht ist, dass der Düsenkopf (37) in einem Mundstück (36) am äußersten Ende des Düsenrohres (31) montiert ist und dabei einen Kanal (38) bildet, der aus einem Hauptkanal (38a) und einem Nebkanal (38b) besteht, und dass die Zündvorrichtung (4) ein Betätigungsteil (42) aufweist, welches gemeinsam mit einem beweglichen Glied (42a) der piezoelektrischen Einheit (43) bewegbar ist, um den Luftsteuerzylinder (32) vorwärtszubewegen.

3. Brennvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass der Rumpf (1) innen mit einem Brennstofffüllventil (11) und mit einer Brennstoffversorgungsleitung (20) versehen ist, deren oberes Ende (20b) sich durch eine obere Platte (1b) des Rumpfes (1) hindurch erstreckt und an deren unterem Ende ein U-förmiges Rohr (20a) angebracht ist, deren beide Schenkel nach oben gerichtet sind.

4. Brennvorrichtung nach Anspruch 3, dadurch gekennzeichnet, dass die Ventilvorrichtung (2) am Rumpf (1) durch ein am oberen Ende (20b) der Brennstoffversorgungsleitung (20) angeordnetes Verbindungsstück (21) befestigt und auf einem Gehäuse (41) der Zündvorrichtung (4) auf dem Rumpf (1) angeordnet ist, und zwar im rechten Winkel zum Gehäuse (41).

5. Brennvorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass das Bewegungsteil (42a) der piezoelektrischen Einheit (42) einen außerhalb des Gehäuses (41) angebrachten Drücker (42) hat.

6. Brennvorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass das Mundstück (36) eine Umhüllung (39) aufweist, in welcher eine Elektrodenhalterung (40) vorgesehen ist, und dass die Sprühelektrode (46) auf dieser Elektrodenhalterung (40) angeordnet ist.

7. Brennvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass der Düsenkopf (37) zur Montage im Mundstück (36) im hinteren Bereich seiner Ummantelung eine Kerbung aufweist.

Revendications

1. Un dispositif brûleur comprenant un réservoir de combustible et un corps ayant une dimension permettant sa saisie à la main, et un dispositif formant soupape, un dispositif de combustion et un dispositif d'allumage qui sont reliés à une partie supérieure dudit corps; ledit dispositif formant soupape comportant un passage recevant du combustible en provenance dudit corps, ledit passage étant pourvu d'un élément d'ouverture et de fermeture; ledit dispositif de combustion comportant un élément de support de buse qui est relié au dispositif formant soupape et qui est en communication avec le passage, un tube de buse dont l'extrémité arrière est reliée audit élément de support de buse et est percée d'un trou d'admission d'air ouvert et fermé par un cylindre de commande d'air monté de façon rétractable, et une tête de buse placée à l'extrémité terminale dudit tube de buse et ledit dispositif d'allumage comprenant une unité piézo-électronique placée dans un boîtier relié au corps, et un élément d'actionnement de ladite unité piézo-électronique, ledit dispositif d'allumage étant relié électriquement à une électrode de décharge placée à l'extrémité du dispositif de combustion et étant dirigé vers ladite tête de buse, caractérisé en ce que le cylindre de commande d'air (32) est relié fonctionnellement à l'élément d'actionnement (42) de l'unité piézo-électronique (43), est également monté de façon tournante et est pourvu d'une ouverture ou partie évidée (32a) qui peut être amenée en coïncidence avec le trou d'admission d'air (31a) et qui permet à un ressort hélicoïdal (34) d'agir lorsqu'il est rétracté.

2. Le dispositif brûleur selon la revendication 1, dans lequel le passage de soupape est pourvu d'un élément de commande (27) qu'un élément de commande d'écoulement (25) fait varier et une soupape à aiguille (28) utilisée entant que ledit élément d'ouverture et de fermeture, l'élément (30) de support de buse est relié au côté du dispositif formant soupape (2), la tête de buse (37) est montée dans un embout de buse (36) prévu à l'extrémité terminale du tube de buse (31) pour former un passage (38) débouchant dans un passage principal (38a) et un passage auxiliaire (38b), et le dispositif d'allumage (4) comprend un élément d'actionnement (42) qui est déplacé en même temps qu'un élément mobile (42a) de l'unité piézo-électronique (43) pour faire avancer le cylindre de commande d'air (32).



3. Le dispositif brûleur selon la revendication 1, dans lequel ledit corps (1) est pourvu intérieurement d'une soupape (11) de remplissage de combustible, et d'un tube (20) d'alimentation en combustible dont l'extrémité supérieure (20b) s'étend au travers d'une plaque supérieure (1b) du corps (1) et qui comporte un tube (20a), en forme de U, dirigé vers le haut et monté à l'extrémité inférieure de celle-ci.

4. Le dispositif brûleur selon la revendication 3, dans lequel ledit dispositif formant soupape (2) est fixé sur le corps (1) par l'intermédiaire d'un élément de liaison (21) à l'extrémité supérieure (20b) dudit tube d'alimentation en combustible (20) et est positionné perpendiculairement sur un boîtier (41) du dispositif d'allumage (4) sur le

corps (1).

5. Le dispositif brûleur selon la revendication 2, dans lequel ledit élément mobile (42a) de ladite unité piézo-électronique (43) comporte un poussoir (42) placé à l'extérieur du boîtier (41).

6. Le dispositif brûleur selon la revendication 2, dans lequel ledit embout de buse (36) comporte un couvercle d'embout (39) dans lequel est prévu un support d'électrode (40) sur lequel est montée l'électrode de décharge (36).

7. Le dispositif brûleur selon la revendication 1, dans lequel la tête de buse (37) comporte une cannelure formée dans la périphérie de sa partie arrière pour un montage dans ledit embout de buse (36).

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