

Description

This invention pertains to an underwater electric-arc cutting and welding torch according to the preamble of claim 1.

Torches of this type are commonly used in salvaging sunken vessels, repairing floating vessels such as ships, barges and the like; and in construction and maintenance of fixed structures such as bridges, docks and offshore drilling platforms.

US-A-2 417 650 discloses the most commonly used type of underwater electric-arc cutting and welding torch. This torch is shown having a gas valve to admit a working fluid such as oxygen to the interior of the torch and to an internal bore in a cutting electrode. The electrode is held in the torch by a spring collet caused to circumferentially grip the electrode by means of a collet ring assembly. Means are provided to conduct electricity to the electrode and all electrical portions of the torch which could be touched by the user (diver) are provided with insulating coatings. The housing of the torch consists of three main parts fitted together, namely a handle tube, an upper jacket, and a cover plate between the handle tube and the jacket. No sealing means are provided at the location where the gas valve is attached to the torch. There is, consequently, quite a number of potential paths for the escape of working fluid and entry of water.

It is the problem underlying the invention to provide an underwater cutting and welding torch which has an uncomplicated build-up and which withstands hard working conditions better.

As a solution of this problem, the torch according to the invention is characterized by the features of the characterizing clause of claim 1.

The design of the torch according to the invention is such that water is prevented from contacting the electrically conducting parts of the torch and working fluid is prevented from escaping from the torch. The one-piece housing may be anatomically shaped for the hand of a user (diver), and a lightweight, easy to operate torch is thus provided. The one-piece construction enhances electrical insulation thus increasing safety in normal operation.

Preferred developments of the invention are subjects of the claims 2 to 6.

Improved electrode gripping results from the use of a collet with a tapered internal bore the collet having an external surface configuration to be used in conjunction with a complementary surface on a collet ring to compress a substantial portion of the bore of the collet around gripping surface of the electrode.

The working fluid control apparatus (valve means) may be affixed to the torch body in a manner such that it can be moved about an axis defined by the main gas passage to facilitate positioning of the torch to the work piece without causing leakage of working fluid when the torch valve is moved in use.

The invention will be elucidated in more detail

by the following description of a specific embodiment:

Figure 1 is a front elevational view of a torch according to the present invention.

Figure 2 is a side elevational view of the torch of Figure 1.

Figure 3 is a section of the torch body and electrical cable connector taken along lines 3—3 of Figure 1, the valve not being sectioned.

Figure 4 is a fragmentary sectional view taken along the lines 4—4 of Figure 2.

Figure 5 is an enlarged fragmentary longitudinal section of a portion of the torch of Figure 1 detailing the electrode gripping mechanism.

Figure 6 is an enlarged fragmentary longitudinal section of the apparatus of Figure 2 showing an electrode in position for cutting or welding.

Figure 7 is an enlarged fragmentary sectional view of that portion of the torch detailing the check valve flash arrestor assembly with the check valve positioned for normal torch operation.

Figure 8 is identical to Figure 7 except that the check valve is shown in position to prevent back-flow through the gas passage.

Underwater torches in commercial use generally consist of a number of sub-assemblies joined together by mechanical means and require complex sealing means and materials to prevent leakage of electrical current. When the torch is used for cutting it requires sealing means to prevent leakage of the working fluid which is usually high pressure oxygen.

Some of the commercial cutting and welding torches utilize a spring collet to secure the electrode and transfer current to the electrode. However prior art collets generally employ essentially a line contact around a portion of the periphery of the electrode to effect the clamping and electrical contact. With a small area of contact between the collet and the electrode, under normal operating conditions wherein the arc breaks and starts frequently the associated mechanical action can cause the electrode to become loosened in the collet and arcing can occur between the collet and the electrode. Loosening of the electrode can promote loss of the gas seal between the electrode and the primary gas passage. Present collet designs have two tapers one is acted upon by the collet ring which forces a second taper against the torch head to effect the gas seal between the collet and the primary gas passage in the torch head. The assembly may become tight without sufficient pressure being exerted upon the electrode or without forcing a good collet seal to the rubber gasket normally associated with the collet and the torch head. Thus oxygen often leaks around the collet.

Current commercial torches tend to be either heavy and bulky or light and small the latter having a relatively short service life.

Referring to the drawing and in particular Figures 1 and 2 the torch 10 of the embodiment includes a gas operating lever assembly 12, an

electrical cable assembly 14 and a collet ring assembly 16.

As shown in Figure 3 the torch 10 includes a head 18 fabricated from a conductive metal such as copper. Depending from head 18 is a conductor 20 of a similar conductive metal such as copper. Conductor 20 terminates in a threaded portion 21 which is adapted to mate with complementary threads 22 in cable adaptor 23 of cable assembly 14 which is in turn affixed to the conductor 26 of welding cable 25 thus permitting current to flow from conductor 26 of welding cable 25 to the torch head 18 via conductor 20.

Head 18 includes a central bore 30 which is counterbored to receive a check valve and flash arrestor assembly 32 as shown more clearly in Figures 7 and 8. The forward end 34 of head 18 includes male threads 36 adapted to receive complementary female threads on collet ring 38. Collet ring 38 includes an outer covering 40 of an insulating material formed to have gripping surfaces or projections 42 (Figure 1 and Figure 2).

Depending from head 18 and communicating with bore 30 is a fluid conduit 42 which in turn is connected to valve assembly 12 to control flow of a working fluid such as oxygen through the torch 10.

The subassembly of the torch head 18, conductor 20 and gas passage 42 are covered with a single insulating coating 44 of epoxy which is shaped to be easily gripped by the diver user. The coating or body 44 is formed to permit a recessed aperture 46 to receive the connector 48 of valve body 50 to permit coupling of valve body 50 to fluid passage conduit 42 as is well known in the art.

As shown in Figure 4, connector 48 of valve body 50 has an annular groove 52 on its outer surface positioned to mate with diametrically opposed threaded apertures 54, 56 in body 44 which are in turn adapted to receive set screws 58 and 60 respectively. When valve assembly 12 is fixed to the torch body 44, valve body adaptor 48 is inserted into recess 46 to receive a projecting end (not shown) of conduit 42. Fluid tight seal 62 composed of a compressible washer and "O" ring 63 is interposed between the conduit 42 and projection 48 of valve body 50 to effect a gas tight seal. By compressing the seal 62 and inserting set screws 58 and 60, sealing of the valve to the fluid conduit 42 takes place. If the operator desires to rotate the gas operating assembly 12 to any other position (e.g. perpendicular to the plane of the paper) all he has to do is loosen the two set screws 58 and 60, rotate the gas operating lever assembly 12 and retighten the set screws 58, 60. While doing this the compressive seal 62 maintains the gas tight relationship between valve body 50 of the gas lever assembly 12 and conduit 42 since the axial position of the adaptor 48 has not changed while the transverse position may have.

Electrical connector 20 projects from a tapered conical recess 64 in body 44 to receive a sealing member such as O ring 24. When the welding

cable assembly 14 is assembled to the adaptor 23, a covering sheath 66 of an insulating material such as heat shrinkable plastic is applied to seal the metal adaptor 23 and conductor 26 from the working environment of the torch. As the cable assembly 14 is threaded to the conductor 20, the plastic boot 66 is compressed against the O ring 24 thus preventing current from leaking out of the torch body 44 and conversely the environment from coming in contact with conductor 20.

Referring to Figures 5 and 6, the forward end of torch body 18 terminates in a stepped-down portion 68 containing male threads 36 as noted above. The stepped-down portion 68 of torch head 18 is adapted to receive a compressible annular sealing member 70 of a synthetic insulating material. Sealing member 70 must be compressible so that when collet assembly 38—40 is in place, a seal can be effected between insulating covering 40 and insulating ring 70 as will hereinafter be more fully described. Disposed partially within the inner bore of torch head 18 is a collet 72 which contains a first end 79 having a tapered aperture 76 communicating with a tapered internal bore 78 (Figure 5). The tapered bore 78 of collet 72 tapers from a large opening adjacent to aperture 76 to a smaller diameter opening 80 at the second end 82, thus providing a negative taper from the first end 79 to the second end 82 of collet 72. On the first end of collet 72 is an outer angular circumferential surface 84 which is adapted to mate with a complementary circumferentially shaped angular surface 84 on collet ring 38. Between the second end 82 of collet 72 and check valve-flash arrestor assembly 32 there is disposed a sealing member 88 in the form of a circular compressible washer made of an insulating material.

As shown in Figure 6 when an electrode is inserted into the bore 78 of collet 72 and seated against sealing member 88, insulating cover 40 and collet ring 38 can be rotated causing collet ring 38 to move to the right as shown in the drawing. As collet ring 38 moves to the right, surface 86 wedges against surface 84 of collet 72 forcing collet 72 against sealing member 88 and forcing a substantial portion of the bore 78 of collet 72 to come in contact with the surface of the electrode 90. The surface of the electrode 90 contacting the collet is uncoated, the projecting portion of the electrode 90 contains an insulating cover 92 which normally extends up to or inside of the bore of insulating cover 40, electrode 90 of Figure 6 having more of coating 92 stripped away for illustration. Thus, when an electrode 90 is inserted into the torch 10, as shown in Figure 6, a gas tight seal is effected between the electrode 90 and the gas passage 42 by means of sealing member 88 being compressed between the end of electrode 90 and an annular shoulder in head 18. Current is carried to the electrode 90 from conductor 30 to head 18 to collet ring 38 and to collet 72. Insulating cover 40 is forced against insulating ring 70 to further seal the collet ring assembly 16 from the environment and to prevent

electrical leakage to the environment.

Figures 7 and 8 show details of the check valve-flash arrestor assembly 32 of Figure 3. The check valve-flash arrestor 32 includes an arrestor holder 100 adapted to receive and position a porous metal flash back arrestor 102. Flash back arrestor 102 may be a screen or other type apparatus as is well known in the welding art. Arrestor holder 100 includes a central passage 104 having an outwardly flared aperture 106 on one end adapted to receive and sealingly engage a check ball 108. On the other end passage 104 of arrestor holder 100 is adapted to mate with internal passage 110 of flash arrestor 102 as is well known in the art. Arrestor holder 100 is adapted to mate with check cage 112 which contains an internal passage 114 communicating with the internal passage 104 of arrestor holder 100 and internal passage 110 of arrestor 102 and in turn with fluid conduit 42 to permit working fluid such as high pressure oxygen to be conducted through valve assembly 12 through conduit 42 and to the electrode 90 (Figure 6). Ball check cage 112 is adapted to permit movement of the check ball 108 to seat in a dual hemispherical receiving section 116 which permits fluid to flow past the check ball 108 when it is in the extreme left position as shown in Figure 7 to a smaller diameter bore 118 in check ball cage 112. As shown in Figure 8, when the flow of working fluid is terminated any back pressure through the bore of the electrode or through the bore of electrode 90 will cause the ball 108 to move to the right and seat against surface 106 of arrestor holder 100 thus preventing gas from being forced back toward the source of working fluid.

When a torch 10, according to the present invention is assembled, the body 44 being of unitary construction insulates a major portion of the torch head 18, gas conduit 44 and conductor 20 from the hand of the diver (user). Sealing means 62 (Figures 3 and 4) permits the diver to vary the position of the gas operating lever assembly 12 without affecting the seal between the valve 50 and conduit 42. Electrical cable assembly 14 is sealingly connected to the torch 10 and integrity of insulation between the torch body 44 and cable assembly 14 is maintained by means of the "O" ring 24 and boot 66.

The electrode 90 is gripped along a major portion of its surface because of the negative tapered bore 78 of collet 72 as shown in Figures 5 and 6. A gas seal is effected between the collet 72 and gas passage 30 in head 18 by means of sealing member 88.

The collet ring 38-insulating cover 40 assembly communicates through the tapered surface 86 to a complementary tapered surface 84 on collet 72 to compress the collet 72 around the electrode 90 to force both the collet 72 and electrode 90 against seal 88 without obstruction. Collet 72 is not compressed against head 18 except by transmission of force through the seal 88, thus insuring a sealing action to prevent escape of the working fluid (e.g. oxygen gas) at the point where collet 72, electrode 90 and seal 88 meet.

From the foregoing, it is apparent that a light weight anatomically compatible underwater cutting and welding torch can be achieved which is adapted to provide a safer torch for the diver (user). Potential leakage points are minimized because there are no multiple subassemblies as in the prior art torches.

Claims

1. An underwater cutting and welding torch (10) of the type comprising an electrically conductive head (18) including means (72) for gripping an electrode (90) having an internal passage, means (38, 40) for forcing said gripping means to grip said electrode, an electrically insulating housing (44) adapted to be held by a user of said torch thus enabling said user to direct said electrode at a workpiece, compressible sealing member (70) between said housing and said means for forcing said gripping means to grip said electrode, means including valve means (12) and a working fluid passage (42) in said housing to permit working fluid to be admitted to said passage in said electrode, and means to connect said head to current supply means (14, 23) for supplying electrical current to the torch, characterized in that said torch (10) is protected against undesired escape of working fluid and entry of water by:

(a) said housing being a one-piece insulating body (44);

(b) a compressible sealing member (63) and locking means (52, 58, 60) provided between said valve means (12) and said body (44) at the location where said valve means (12) is removably attached to said body (44) and communicates with said head (18) through said working fluid passage (42); and

(c) a resilient sealing member (24) provided between said current supply means (14, 23) and said body (44) at the location where said current supply means (14, 23) contacts a conductor (20) connected to the head (18).

2. A torch according to claim 1 wherein there is included a check valve and flash arrestor assembly (32) to prevent backflow of water and other foreign objects into said torch body (44), said assembly (32) including an arrestor holder (100) and a check cage (112) readily removable through a central bore of said torch head.

3. A torch according to claim 1 or 2 wherein the electrode gripping means includes a spring collet (72) having a first end (79), a second end (82) and a longitudinal bore (78) therethrough said first end (79) being adapted to receive an electrode (90) inserted into said bore (78) said bore (78) tapering negatively from said first end (79) to said second end (82).

4. A torch according to claim 3 wherein said first end (79) of said collet (72) includes a male angular circumferential surface (84) adapted to mate with a complementary female angular circumferential surface (86) on a collet ring (38) whereby when said collet ring (38) is urged against said collet (72), said collet bore (78) closes about said elec-

electrical leakage to the environment.

Figures 7 and 8 show details of the check valve-flash arrestor assembly 32 of Figure 3. The check valve-flash arrestor 32 includes an arrestor holder 100 adapted to receive and position a porous metal flash back arrestor 102. Flash back arrestor 102 may be a screen or other type apparatus as is well known in the welding art. Arrestor holder 100 includes a central passage 104 having an outwardly flared aperture 106 on one end adapted to receive and sealingly engage a check ball 108. On the other end passage 104 of arrestor holder 100 is adapted to mate with internal passage 110 of flash arrestor 102 as is well known in the art. Arrestor holder 100 is adapted to mate with check cage 112 which contains an internal passage 114 communicating with the internal passage 104 of arrestor holder 100 and internal passage 110 of arrestor 102 and in turn with fluid conduit 42 to permit working fluid such as high pressure oxygen to be conducted through valve assembly 12 through conduit 42 and to the electrode 90 (Figure 6). Ball check cage 112 is adapted to permit movement of the check ball 108 to seat in a dual hemispherical receiving section 116 which permits fluid to flow past the check ball 108 when it is in the extreme left position as shown in Figure 7 to a smaller diameter bore 118 in check ball cage 112. As shown in Figure 8, when the flow of working fluid is terminated any back pressure through the bore of the electrode or through the bore of electrode 90 will cause the ball 108 to move to the right and seat against surface 106 of arrestor holder 100 thus preventing gas from being forced back toward the source of working fluid.

When a torch 10, according to the present invention is assembled, the body 44 being of unitary construction insulates a major portion of the torch head 18, gas conduit 44 and conductor 20 from the hand of the diver (user). Sealing means 62 (Figures 3 and 4) permits the diver to vary the position of the gas operating lever assembly 12 without affecting the seal between the valve 50 and conduit 42. Electrical cable assembly 14 is sealingly connected to the torch 10 and integrity of insulation between the torch body 44 and cable assembly 14 is maintained by means of the "O" ring 24 and boot 66.

The electrode 90 is gripped along a major portion of its surface because of the negative tapered bore 78 of collet 72 as shown in Figures 5 and 6. A gas seal is effected between the collet 72 and gas passage 30 in head 18 by means of sealing member 88.

The collet ring 38-insulating cover 40 assembly communicates through the tapered surface 86 to a complementary tapered surface 84 on collet 72 to compress the collet 72 around the electrode 90 to force both the collet 72 and electrode 90 against seal 88 without obstruction. Collet 72 is not compressed against head 18 except by transmission of force through the seal 88, thus insuring a sealing action to prevent escape of the working fluid (e.g. oxygen gas) at the point where collet 72, electrode 90 and seal 88 meet.

From the foregoing, it is apparent that a light weight anatomically compatible underwater cutting and welding torch can be achieved which is adapted to provide a safer torch for the diver (user). Potential leakage points are minimized because there are no multiple subassemblies as in the prior art torches.

Claims

1. An underwater cutting and welding torch (10) of the type comprising an electrically conductive head (18) including means (72) for gripping an electrode (90) having an internal passage, means (38, 40) for forcing said gripping means to grip said electrode, an electrically insulating housing (44) adapted to be held by a user of said torch thus enabling said user to direct said electrode at a workpiece, compressible sealing member (70) between said housing and said means for forcing said gripping means to grip said electrode, means including valve means (12) and a working fluid passage (42) in said housing to permit working fluid to be admitted to said passage in said electrode, and means to connect said head to current supply means (14, 23) for supplying electrical current to the torch, characterized in that said torch (10) is protected against undesired escape of working fluid and entry of water by:

(a) said housing being a one-piece insulating body (44);

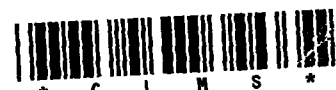
(b) a compressible sealing member (63) and locking means (52, 58, 60) provided between said valve means (12) and said body (44) at the location where said valve means (12) is removably attached to said body (44) and communicates with said head (18) through said working fluid passage (42); and

(c) a resilient sealing member (24) provided between said current supply means (14, 23) and said body (44) at the location where said current supply means (14, 23) contacts a conductor (20) connected to the head (18).

2. A torch according to claim 1 wherein there is included a check valve and flash arrestor assembly (32) to prevent backflow of water and other foreign objects into said torch body (44), said assembly (32) including an arrestor holder (100) and a check cage (112) readily removable through a central bore of said torch head.

3. A torch according to claim 1 or 2 wherein the electrode gripping means includes a spring collet (72) having a first end (79), a second end (82) and a longitudinal bore (78) therethrough said first end (79) being adapted to receive an electrode (90) inserted into said bore (78) said bore (78) tapering negatively from said first end (73) to said second end (82).

4. A torch according to claim 3 wherein said first end (79) of said collet (72) includes a male angular circumferential surface (84) adapted to mate with a complementary female angular circumferential surface (86) on a collet ring (38) whereby when said collet ring (38) is urged against said collet (72), said collet bore (78) closes about said elec-



trode (90) along a substantial portion of the surface of said bore (78).

5. A torch according to any of the claims 1 to 4 wherein said valve means (12) is freely movable to position said valve (50) and a valve operating means associated therewith in varying positions relative to said torch head (18) while maintaining a fluid tight seal between said valve (50) and said torch body (44).

6. A torch according to any one of the claims 1 to 5 wherein said sealing member (24) between said body (44) and said current supply means (14, 23) is an O-ring encompassing said conductor (20), said O-ring being arranged between said body (44) and an insulating covering sheath (66) encompassing the end portion of said current supply means (14, 23).

Revendications

1. Chalumeau coupeur et soudeur sous l'eau (10), du type comprenant une tête conductrice de l'électricité (18) comportant des moyens (72) pour maintenir une électrode (90) présentant un passage interne, des moyens (38, 40) pour forcer lesdits moyens de maintien à tenir ladite électrode, un carter électriquement isolant (44) agencé pour être tenu par un utilisateur du chalumeau, pour ainsi permettre audit utilisateur de diriger l'électrode sur une pièce à travailler, un organe d'étanchéité compressible (70) situé entre le carter et les moyens pour forcer les moyens de maintien à tenir ladite électrode, des moyens, comprenant un moyen à soupape (12) et un passage pour fluide de travail (42) dans le carter, destiné à permettre au fluide de travail d'être admis dans ledit passage de l'électrode, et des moyens pour relier ladite tête à des moyens d'amenée de courant (14, 23), afin de fournir un courant électrique au chalumeau, caractérisé en ce que le chalumeau (10) est protégé contre les fuites de fluides de travail et l'entrée d'eau indésirables par le fait que:

(a) ledit carter est un corps isolant monobloc (44);

(b) un organe d'étanchéité compressible (63) et des moyens de blocage (52, 58, 60) sont prévus entre ledit moyen à soupape (12) et le corps (44) à l'emplacement où le moyen à soupape (12) est fixé de façon amovible au corps (44) et communique avec la tête (18) par l'intermédiaire dudit passage de fluide de travail (42); et

(c) un organe d'étanchéité élastique (24) est prévu entre les moyens d'amenée de courant (14, 23) et le corps (44) à l'emplacement où lesdits moyens d'amenée de courant (14, 23) sont en contact avec un conducteur (20) relié à la tête (18).

2. Chalumeau selon la revendication 1, dans lequel est prévu un ensemble de clapet de retenue et de pare-étincelles (32) afin d'empêcher le retour d'eau et d'autres objets étrangers dans le corps de chalumeau (44), ledit ensemble (32) comprenant un support de pare-étincelles (100) et une cage de retenue (112) facilement amovible

par un alésage central de ladite tête de chalumeau.

3. Chalumeau selon la revendication 1 ou 2, dans lequel les moyens de maintien de l'électrode comprennent une douille élastique (72) comportant une première extrémité (79), une seconde extrémité (82) et un alésage longitudinal traversant (78), ladite première extrémité (79) étant agencée pour recevoir une électrode (90) insérée dans l'alésage (78), l'alésage (78) étant évasé en se rétrécissant de la première extrémité (79) vers la seconde extrémité (82).

4. Chalumeau selon la revendication 3, dans lequel la première extrémité (79) de la douille (72) comprend une surface circonférentielle inclinée mâle (84) agencée pour coopérer avec une surface circonférentielle inclinée femelle complémentaire (86) prévue sur une bague de douille (38) pour qu'ainsi, lorsque ladite bague de douille (38) est repoussée contre ladite douille (72), l'alésage (78) de la douille se ferme autour de l'électrode (90) le long d'une partie substantielle de la surface de l'alésage (78).

5. Chalumeau selon l'une quelconque des revendications 1 à 4, dans lequel le moyen à soupape (12) peut être déplacé librement pour positionner ladite soupape (50) et des moyens de commande de la soupape associés à celle-ci en des positions diverses par rapport à la tête de chalumeau (18) pendant qu'une étanchéité au fluide est assurée entre ladite soupape (50) et ledit corps de chalumeau (44).

6. Chalumeau selon l'une quelconque des revendications 1 à 5, dans lequel l'organe d'étanchéité (24) situé entre le corps (44) et les moyens d'amenée de courant (14, 23) consiste en une bague en "O" entourant ledit conducteur (20), la bague en "O" étant disposée entre le corps (44) et une gaine d'enveloppement isolante (66) entourant la partie d'extrémité desdits moyens d'amenée de courant (14, 23).

Patentansprüche

1. Unterwasser-Schneid- und Schweißbrenner (10) des Typs mit einem elektrisch leitenden Kopf (18), mit einer Einrichtung (72) zum Einspannen einer inneren Durchlaß aufweisenden Elektrode (90), mit einer Einrichtung (38, 40), um die Einspanneinrichtung zum Einspannen der genannten Elektrode zu zwingen, mit einem elektrisch isolierenden Gehäuse (44), das von einem Benutzer des genannten Brenners gehalten werden kann und es dem genannten Benutzer so ermöglicht, die genannte Elektrode auf ein Werkstück zu richten, mit einem zusammendrückbaren Dichtglied (70) zwischen dem genannten Gehäuse und der genannten Einrichtung, um die genannte Einspanneinrichtung zum Einspannen der genannten Elektrode zu zwingen, mit einer Einrichtung, die eine Ventileinrichtung (12) und eine Arbeitsfluidpassage (42) in dem genannten Gehäuse aufweist, um einen Zutritt von Arbeitsfluid zu dem genannten Durchlaß in der genannten Elektrode zu erlauben, und mit einer Einrichtung



zum Verbinden des genannten Kopfes mit einer Stromzuführungseinrichtung (14, 23), um dem Brenner elektrischen Strom zuzuführen, dadurch gekennzeichnet, daß der genannte Brenner (10) gegen unerwünschten Austritt von Arbeitsfluid und Eintritt von Wasser durch folgendes geschützt ist:

(a) das genannte Gehäuse ist ein einstückiger, isolierender Körper (44);

(b) ein zusammendrückbares Dichtstück (63) und eine Verriegelungseinrichtung (52, 58, 60) sind vorgesehen zwischen der genannten Ventileinrichtung (12) und dem genannten Körper (44) an der Stelle, wo die genannte Ventileinrichtung (12) an dem genannten Körper (44) demontierbar befestigt ist und mit dem genannten Kopf (18) durch die genannte Arbeitsfluidpassage (42) in Verbindung steht, und

(c) ein elastisches Dichtglied (24) ist zwischen der genannten Stromzuführungseinrichtung (14, 23) und dem genannten Körper (44) an der Stelle vorgesehen, wo die genannte Stromzuführungseinrichtung (14, 23) mit einem mit dem Kopf (18) verbundenen Leiter (20) in Kontakt steht.

2. Ein Brenner nach Anspruch 1, der ein Rückschlagventil und eine Flammenrückhalteanordnung (32) aufweist, um Rückströmung von Wasser und anderen Fremtteilen in den genannten Brennerkörper (44) zu verhindern, wobei die genannte Anordnung (32) eine Halterung (100) des Rückhalters und einen Rückschlagkäfig (112), leicht demontierbar durch eine zentrale Bohrung des genannten Brennerkopfes, aufweist.

3. Ein Brenner nach Anspruch 1 oder 2, bei dem die Elektrodeneinspanneinrichtung einer federnde Hülse (72) aufweist mit einem ersten Ende (79), einem zweiten Ende (82) und einer längs

hindurchführenden Bohrung (78), wobei das genannte erste Ende (79) eine in die genannte Bohrung (78) eingesetzte Elektrode (90) aufnehmen kann und die genannte Bohrung (78) von dem genannten ersten Ende (73) zu dem genannten zweiten Ende (82) negativ geschrägt ist.

4. Ein Brenner nach Anspruch 3, bei dem das genannte erste Ende (79) der genannten Hülse (72) eine vorstehende, abgewinkelte Umfangsfläche (84) aufweist, die mit einer komplementären, umschließenden, abgewinkelten Umfangsfläche (86) an einem Hülsenring (38) passend zusammenwirken kann, wodurch sich die genannte Hülsenbohrung (78), wenn der genannte Hülsenring (38) gegen die genannte Hülse (72) gedrückt wird, entlang eines wesentlichen Bereichs der Oberfläche der genannten Bohrung (78) um die genannte Elektrode (90) schließt.

5. Ein Brenner nach einem der Ansprüche 1 bis 4, bei dem die genannte Ventileinrichtung (12) frei bewegbar ist, um das genannte Ventil (50) und eine diesem zugeordnete Ventilbetätigungseinrichtung in unterschiedlichen Positionen relativ zu dem genannten Brennerkopf (18) zu positionieren, während eine fluiddichte Abdichtung zwischen dem genannten Ventil (50) und dem genannten Brennerkörper (44) beibehalten ist.

6. Ein Brenner nach einem der Ansprüche 1 bis 5, bei dem das genannte Dichtglied (24) zwischen dem genannten Körper (44) und der genannten Stromzuführungseinrichtung (14, 23) ein den genannten Leiter (20) umgebender O-Ring ist, der zwischen dem genannten Körper (44) und einem isolierenden Abdeckmantel (66) angeordnet ist, der den Endbereich der genannten Stromzuführungseinrichtung (14, 23) umgibt.

