Nov. 20, 1934. G. WINCKLER 1,981,766

BURNER FOR LIQUID FUEL ESPECIALLY FOR CUTTING AND WELDING UNDER WATER

Filed March 1, 1933

Fig. 1.

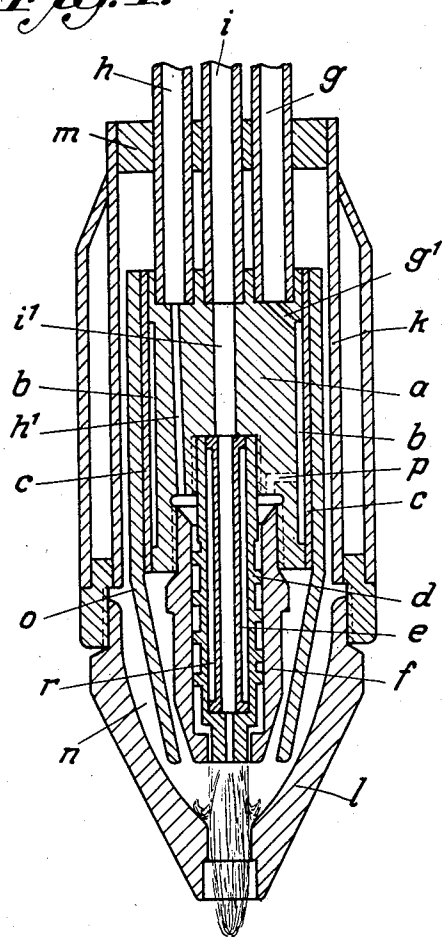


Fig. 2.

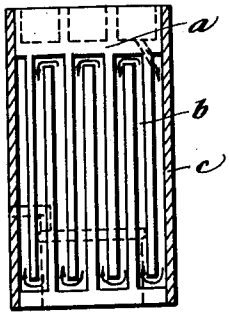
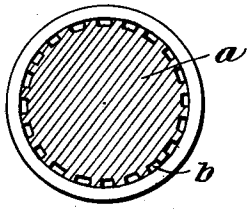


Fig. 3.



Inventor:
G. Winckler

By: Marks & Clerk
Attys.

Patented Nov. 20, 1934 1,981,766

UNITED STATES PATENT OFFICE

1,981,766

BURNER FOR LIQUID FUEL ESPECIALLY FOR CUTTING AND WELDING UNDER WATER

Gustav Winckler, Dortmund, Germany, assignor, by mesne assignments, to the firm Dortmund-Hoerder Hüttenverein Aktiengesellschaft, Dortmund, Germany

Application March 1, 1933, Serial No. 659,225
In Germany March 18, 1932

6 Claims. (Cl. 158—27.4)

This invention relates to the gasification of liquid fuel inside a burner.

In under-water cutting burners for liquid fuel, such as benzine, benzol and the like, gasification of the fuel by electric resistance heating is well known, but the accommodation of this heating device requires considerable overall length of the burner and thus renders cutting almost impossible at points that are not readily accessible

Heating of the gasifying chamber in such burners requires an electric source of current, such as a dynamo driven by a benzol-motor, or current must be supplied from a neighboring point of distribution by aerial wires or cables. Both kinds of current supply are expensive, even the latter, for it must be taken into consideration that the point of use may be located in the middle of a river and current can then be supplied from the banks only by means of waterproof cables or aerial wires whose installation is expensive and takes up much time, so that the costs involved, especially in case of small jobs, is out of proportion to the cost of under-water cutting itself.

The manufacture of electrically heated under-water cutting burners is highly complicated and expensive, particularly because the heating space of the burner has to be protected against the entrance of water, which is a difficult task owing to the heating and expansion of the burner. The heating space is therefore placed under pressure with nitrogen to prevent water from entering, but this arrangement requires an additional hose line bringing the total up to five supply lines serving, respectively, for current, nitrogen, fuel, heating and cutting oxygen.

All these drawbacks are eliminated by the burner according to the invention which provides a burner adapted to all purposes, in which the heat of the burner flame is utilized for gasifying the liquid fuel. The overall length of the new burner amounts to only approximately one-half of that of the known burners, so that cutting can be carried out in narrow spaces and on objects that are difficultly accessible. Gasification of the fuel is effected by the flame of the burner without resorting to auxiliary heating as is necessary in the known benzol burners in the open. The manufacture of the new burner has been considerably simplified and thus cheapened. The supplying means for nitrogen and current have been dispensed with, so that the new burner, even if used for cutting torches under water, requires only three supplying members serving, respectively, for fuel, heating and cutting oxygen. Owing to the reduction of the supplying members from five to three, the work of the diver will be considerably facilitated, not counting the saving effected in hose lines and supply members.

By way of example, a burner for autogenous cutting under-water will be described below as one embodiment of the invention which is illustrated in the accompanying drawing in which:

Figure 1 is a longitudinal section of the burner;

Figure 2 is a longitudinal section of the gasifying chamber; and

Figure 3 a cross-section of the gasifying chamber.

Referring to the drawing, *a* is a heater element having a fuel duct *b*. *c* is a jacket pipe covering the heater *a*. *d* is the cutting nozzle with an in-built insulation insertion *e*. *f* is the heating nozzle, *g* the fuel supply, *h* the supply for heating oxygen, *i* the supply for cutting oxygen, *k* a double-walled insulating jacket, *l* the heat baffle member, *m* a shutting-off plate, *n* a heating space and *o* a heat returning member.

Liquid fuel, such as benzol, benzine, oil, petroleum or the like, supplied under pressure enters through the supply pipe *g* and the bore g^1 the heater element *a* and is gasified in the zigzag-shaped duct *b*, Fig. 2, by means of heat dammed up from the space *n* and returned by the member *o* from the cuting flame. The heated or gasified fuel enters through the channel *p* the space between the heating nozzle *f* and the cutting nozzle *d* in order to mix with the oxygen supplied by the pipe *h* and the bore h^1. Thorough mixing is insured by means of baffle faces and change of direction in the space between the cutting nozzle *d* and the heating nozzle *f* in known manner. The mixing of the fuel and heating oxygen may be effected also prior to entrance into the member *a*, or the fuel and heating oxygen may be separately introduced into the heating nozzle from several bores.

First heating of the burner takes place without auxiliary flame, only the shutting-off members for fuel and heating oxygen being somewhat opened and the atomized fuel mixed with oxygen ignited. After a very short time both shutting-off members may be opened farther, as perfect gasification has taken place, and the heating flame may be adjusted. Further uninterrupted gasification is effected by means of the baffle member *l* and the radiating and conducting heat of the cutting flame transmitted by the member *l* to the return member *o*. The heat baffle member may have any desired form. To prevent cooling by the cutting oxygen passing through the cutting nozzle, the latter is provided with an insertion *e* forming the passage for the cutting oxy-

gen and consisting of poorly conducting metal, porcelain or a similar non-combustible material. Furthermore, as shown in the example illustrated, the insertion *e* may be separated from the nozzle by a space *r*. It is further possible to use preheated oxygen, which renders operation of course more expensive.

The double-walled insulating jacket *k* which prevents cooling of the burner by the surrounding water carries also the heat baffle member *l* which divides the flame into two parts, the main portion entering as flame through the opening in front while the remainder thereof is dammed up and heats the copper heat return member *o* or the heating space *n*, the heating of which can be regulated by the inner construction of the heat baffle member *l* or by the distance from the outlet of the fuel gases or by axial adjustability of the member *l*.

The burner is shut off watertight on the side where the supply members are located by a plate *m* which may also serve as a valve provided with shutting off means for the supply members, whereby short overall length is insured.

When the burner is used in the open air, the members *l* and *k* are not required.

I claim:—

1. A burner for liquid fuel, especially for cutting and welding under water, consisting of an inner heating body having passages for the fuel and the oxygen, a nozzle at one end of the inner body, a heat returning member surrounding the inner body and the nozzle, and a heat baffle member surrounding the heat returning member.

2. A burner for liquid fuel, especially for cutting and welding under water, consisting of an inner heating body having passages for the fuel and the oxygen, a nozzle at one end of the inner body, a heat returning member surrounding the inner body and the nozzle, and a heat baffle member surrounding the heat returning member with a space-room, the said baffle member being provided with an opening opposite the nozzle.

3. An under-water welding and cutting burner for liquid fuel, consisting of an inner heater element having passages for the fuel, the heating oxygen and the cutting oxygen, a heating nozzle and a cutting nozzle extending from the heater element, a heat returning member enclosing the heater element and surrounding the said nozzles with a space-room, and a heat baffle member extending beyond the heat returning member and surrounding the same with a heating space, the said baffle member being provided with an opening opposite the nozzles.

4. An under-water welding and cutting burner for liquid fuel, consisting of an inner heater element having passages for the fuel, the heating oxygen and the cutting oxygen, the heater element being provided with recesses of zig-zag formation at its outer surface, a jacket pipe enclosing the surface of the heater element provided with the said recesses so that a gasifying chamber of zig-zag formation for the fuel is formed, a heating nozzle and a cutting nozzle extending from the heater element, a heat returning member surrounding the said nozzles with a space and enclosing the said jacket pipe, and a heat baffle member extending beyond the heat returning member and surrounding the same with a heating space, the said baffle member being provided with an opening opposite the nozzles.

5. An under-water welding and cutting burner for liquid fuel, consisting of an inner heater element having passages for the fuel, the heating oxygen and the cutting oxygen, the heater element being provided with recesses of zig-zag formation at its outer surface, a jacket-pipe enclosing the surface of the heater element provided with the said recesses so that a gasifying chamber of zig-zag formation for the fuel is formed, a heating nozzle and a cutting nozzle extending from the heater element, a heat returning member being tapered at the front end and surrounding the said nozzles with a space and enclosing the said jacket-pipe, and a heat baffle member extending beyond the heat returning member and surrounding the same with a heating space, the said baffle member being tapered at the front end and provided with an opening opposite the nozzles.

6. An under-water cutting and welding burner for liquid fuel, consisting of a substantially cylindrical inner heater element, supply pipes for the fuel, the heating oxygen and the cutting oxygen, the said pipes being attached to one side of the heater element, the said heater element being provided with recesses in zig-zag formation at its outer surface, a jacket-pipe enclosing the said surface of the heater element so that a gasifying chamber of zig-zag formation is formed, a heating nozzle and a cutting nozzle, the nozzles being concentrically disposed at the lower end of the heater element, the said cutting nozzle being provided with an insulating insertion, a passage in the heater element for connecting the cutting nozzle with the supply pipe for the cutting oxygen, a second passage in the heater element for directly connecting the heating nozzle with the supply pipe for the heating oxygen, and passages in the heater element for connecting the said gasifying chamber with the fuel supply pipe and the heating nozzle, a heat returning member having a cylindrical and a conical part, the said heat returning member enclosing with its cylindrical part the jacket-pipe of the heater element and surrounding the nozzles with its conical part with a space, a plate transversely attached to the said supply pipes and provided with bores for the same, a double-walled insulating jacket surrounding the heat returning member with a space and being attached to the said plate, and a heat baffle member connected to the said insulating jacket, the said baffle member being tapered and provided with a bore opposite the nozzles and surrounding the heat returning member with a heating space.

GUSTAV WINCKLER.