H. KNAPP.

BURNER FOR CUTTING METAL OR FOR AUTOGENEOUS WELDING.

APPLICATION FILED JULY 5, 1910.

1,000,018.

tented Aug. 8, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

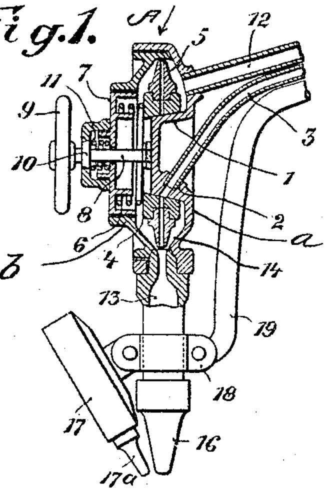


Fig. 2.

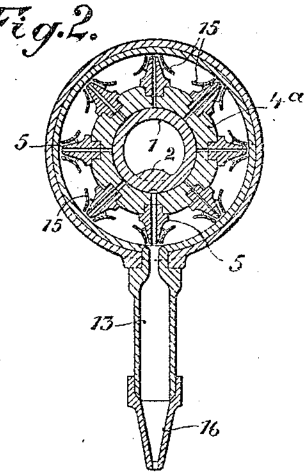
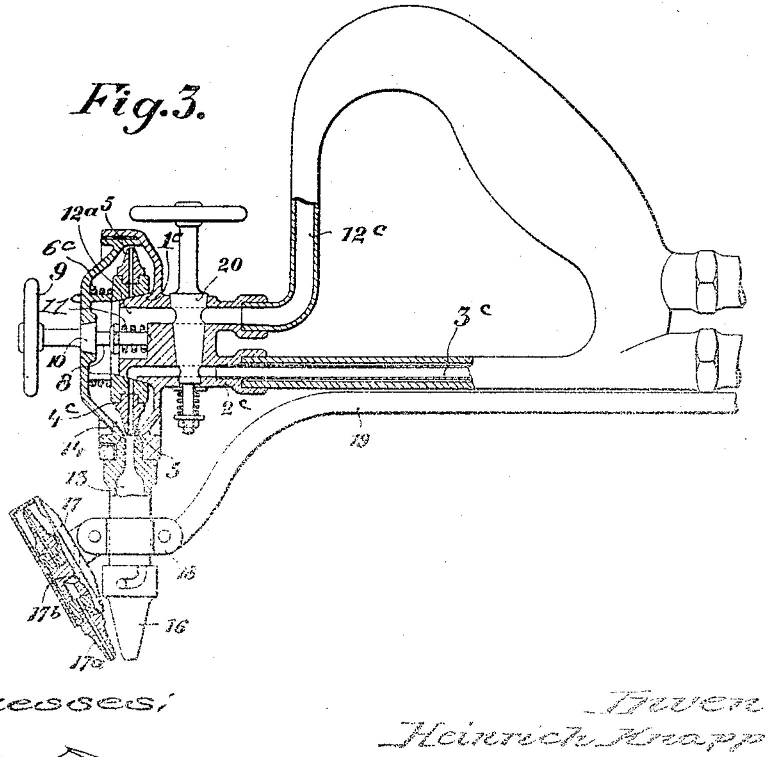


Fig. 3.



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2 SHEETS—SHEET 2

Fig. 4

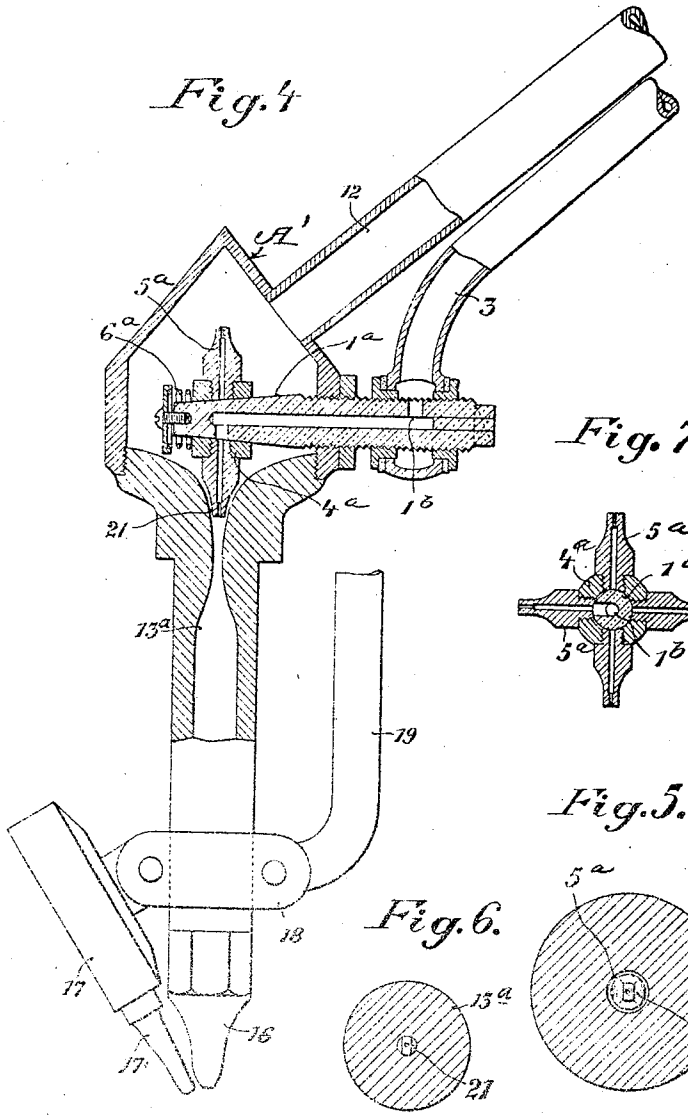

Fig. 7.

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE

HEINRICH KNAPP, OF WEIMAR, GERMANY.

BURNER FOR CUTTING METAL OR FOR AUTOGENOUS WELDING.

1,000,018. Specification of Letters Patent. Patented Aug. 8, 1911.

Application filed July 5, 1910. Serial No. 570,439.

To all whom it may concern:

Be it known that I, HEINRICH KNAPP, engineer, a subject of the German Emperor, residing at Weimar, Grand Duchy of Saxe-Weimar-Eisenach, Germany, have invented certain new and useful Improvements in or Relating to Burners for Cutting Metal or for Autogenous Welding, of which the following is a specification.

This invention relates to improvements in blow pipes and it proposes a construction which is superior to that ordinarily employed in a number of respects but more particularly in respect of involving a self-contained, compact and graduated arrangement of a group of oxygen supply nozzles, each of a different capacity from the others, and any one of which may be positioned in operative relation to the mixing chamber by virtue of a simple adjustment which may be easily and quickly made. It will be readily apparent therefore that the present construction avoids the necessity of having on hand a number of interchangeable burners, nozzles, or mixing chambers, since the intensity of the flame or the degree of heat may be almost instantly regulated to accord with the character and environments of the work by making the adjustment aforesaid.

The invention is of further advantage in that the arrangement is of such nature that the passage of the oxygen into the mixing chamber is accompanied by or produces an injector-like feeding action of the gas whereby independence of the particular level of the gas holder is secured and the use of pressure regulators or the like is avoided.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical longitudinal section of one form of construction; Fig. 2 is a vertical cross section of the same; Fig. 3 is a vertical longitudinal section of a modified form of construction; Fig. 4 is a similar view of a further modified form of construction; Figs. 5 and 6 are horizontal sections in different planes taken through the inlet end of the mixing chamber shown in Fig. 4; and Fig. 7 is a detail sectional view of the nozzle carrier and a group of nozzles thereon embodied in the construction shown in Fig. 4.

Similar characters of reference designate corresponding parts throughout the several views.

In the construction shown in Figs. 1 and 2, a casing A is employed to inclose and to provide for the operative connection and assemblage of the working parts. This casing is made in two suitably connected half sections *a* and *b*. The section *a* is formed with an inwardly directed frusto-conical projection 1 which is provided at a suitably selected point with an oxygen duct or passage 2, alining with and forming a continuation of an oxygen supply pipe 3. The projection 1 constitutes an internal bearing for an annular rotatably assembled nozzle carrier 4, which carries the radially disposed oxygen nozzles 5, arranged at suitable intervals, and each being of a different capacity from the others, whereby, in accordance with which particular nozzle is alined with the mixing chamber, the proportion of oxygen supplied may be increased or reduced. The hub 4^a of the carrier 4 conformably surrounds the projection 1 and its seating is maintained by a suitable spring 6, one end of which bears against said hub 4^a and the other end of which bears against a cover plate 7 which forms a part of the half section *b*. The nozzle carrier is provided with an axially projecting setting stem 8, which extends through the plate 7 and is provided with a hand wheel 9. The plate 7 is provided with a box and the stem 8 is provided with a conical flange 10 which fits conformably in an opening in the front wall of the box and is pressed into sealing engagement with the face of the opening by a spring 11 which surrounds the stem and bears at one end against the plate 7 and at the other end against the flange 10. The assemblage of the stem 8 is thus of gas-tight character. Gas, preferably acetylene, is supplied to the casing A through a pipe 12 which is connected to the section *a* of said casing. The shell of the mixing chamber is shown at 13 and projects radially from the casing. The inner end of the shell is fitted into the casing at a point which will aline the mixing chamber and the nozzle adjacent thereto. Each nozzle, it will be observed, is of tapering outline and the casing is also tapering, as at 14, adjacent the inlet end of the mixing chamber. Consequently a gradually constricting throatway intervenes between the tapering faces of the casing and the operating nozzle, which throatway provides for the injector-like action above referred to whereby the gas is forcibly drawn into the

mixing chamber. This action may be further assisted by guide plates 15 arranged at opposite sides of each nozzle. A mouthpiece 16 is fitted to the end of the shell 13 and in consideration of the fact that different sizes of mouthpieces must be used in connection with different widths of plates or bars, the connection between said mouthpiece and said shell is of detachable character, *e. g.* a bayonet joint. For a cutting operation an adjunct is provided which consists of a casing 17 secured on the shell 13 as by a collar 18, and inclosing a rotatably mounted nozzle carrier provided with nozzles 17^a, of different capacity and arranged at suitable intervals. Each nozzle 17^a as it may be positioned adjacent the mouthpiece 16, is supplied with oxygen through a duct 17^b and an oxygen supply pipe 19 communicates with said duct. The nozzles 17^a need not be arranged in a closed casing, as they are merely used for directing the additional oxygen supplied through the pipe 19, against the flame.

In Fig. 3 a construction is shown which is similar in the main to that shown in Fig. 1, and embodies parts corresponding generally to the parts in Fig. 1 which are designated by the same reference numerals, these reference numerals in Fig. 3 being differentiated, however, by exponents. These parts are the projection 1^c, the oxygen duct or passage 2^c, the oxygen supply pipe 3^c, the nozzle carrier 4^c, the spring 6^c to maintain the position of the nozzle carrier 4^c, the spring 11^c to act on the stem 8 and to cause the flange 10 of the latter to seal the opening in the casing through which said stem passes, and the pipe 12^c for supplying gas to the casing, the said pipe communicating with the casing through a duct 12^a in the part 1. In this form of construction the part 1^c has a coaxial outward extension in which are continued the duct or passage 2^c for the oxygen and the duct or passage 12^a for the gas. A turning plug 20 is fitted in this extension and is provided with independent openings arranged to register with the respective passages 2^c and 12^a. The plug 20, obviously, provides for the simultaneous regulation of the supply of gas and oxygen.

The construction shown in Figs. 4 to 7 is designed with reference to burners which are always used for practically the same work and which require no changing of mouthpieces. In this case the conical part, as 1^a, is provided at the end of a relatively long shank and, as before, constitutes an internal bearing for the nozzle carrier, as 4^a, which carries the nozzles, as 5^a, and is held in position by the spring, as 6^a. The part 1^a is provided with an axial duct 1^b which supplies oxygen to the nozzles 5^a and forms a continuation of the oxygen supply pipe 3. The shank of the part 1^a is threaded into the casing which, in this case, is designated A′ and is not necessarily of sectional construction. The gas supply pipe 12 is fitted in the upper end of the casing and the lower end of the casing is internally threaded for attachment to the enlarged inlet end of the mixing chamber shell, in this case designated 13^a. The assemblage of the parts is of such nature that any one of the nozzles 5^a which may be alined with the mixing chamber will extend some distance into the inlet end of said chamber. Each nozzle is flattened at opposite sides, as at 21, and consequently when a nozzle is alined with the mixing chamber, the sides which are not flattened will contact with the wall of the chamber and will thereby center the nozzle, while the flattened sides will afford narrow passages through which the gas will pass from the casing to the mixing chamber. The proper alinement of the nozzles with the mixing chamber is secured by a necessary adjustment of the part 1^a, which adjustment is possible owing to the screw thread connection between said part 1^a and the casing A′. The rotation of the nozzle carrier is effected by hand after the shell 13^a has been disconnected from the casing A′. A narrower or wider nozzle, as may be required, is then positioned for alinement with the mixing chamber after which the casing A′ and the shell 13^a are screwed together.

Having fully described my invention, I claim:

1. A blow pipe of the type set forth comprising a closed casing, a shell projecting therefrom and forming a mixing chamber, a nozzle carrier rotatably mounted within the casing, a plurality of nozzles of different capacities arranged on the carrier, a part having an oxygen supply duct with which a nozzle alines when it also alines with the mixing chamber, and a gas supply pipe communicating with the casing.

2. A blow pipe of the type set forth comprising a closed casing, a shell projecting radially therefrom and forming a mixing chamber, a conical part projecting into the casing and provided with an oxygen passage, an annular nozzle carrier rotatably fitted on the conical part, a plurality of radially disposed nozzles of different capacities arranged on the carrier, and a gas supply pipe communicating with the casing.

3. A blow pipe of the type set forth comprising a closed casing, a shell projecting radially therefrom and forming a mixing chamber, a conical part projecting into the casing and provided with an oxygen passage, an annular nozzle carrier rotatably fitted on the conical part, a spring for holding the nozzle carrier in position on the conical part, a plurality of radially disposed nozzles of different capacities arranged on

the carrier, and a gas supply pipe communicating with the casing.

4. A blow pipe of the type set forth comprising a closed casing, a shell projecting therefrom and forming a mixing chamber, a nozzle carrier rotatably mounted in the casing, a stem for turning the nozzle carrier and which projects through a wall of the casing, a plurality of nozzles of different capacities arranged on the carrier, a part having an oxygen supply duct and with which a nozzle alines when it also alines with the mixing chamber, and a gas supply pipe communicating with the casing.

5. A blow pipe of the type set forth comprising a closed casing, a shell projecting radially therefrom and forming a mixing chamber, a conical part projecting into the casing and provided with an oxygen passage, an annular nozzle carrier rotatably fitted on the conical part, a stem projecting axially from the nozzle carrier through an adjacent wall of the casing and by which the nozzle carrier may be turned, a plurality of radially disposed nozzles of different capacities arranged on the carrier, and a gas supply pipe communicating with the casing.

6. A blow pipe of the type set forth comprising a closed casing, a shell projecting therefrom and forming a mixing chamber, the shell having a tapering inlet end, a nozzle carrier rotatably mounted in the casing, a plurality of nozzles of different capacities arranged on the carrier, each nozzle having such outline as to coact with the tapering inlet end to provide a gradually constricting throatway through which gas may flow from the casing to the mixing chamber, a part having an oxygen supply duct and with which a nozzle alines when it also alines with the mixing chamber, and a gas supply pipe communicating with the casing.

7. A blow pipe of the type set forth comprising a closed casing, a shell projecting therefrom and forming a mixing chamber, a projection arranged within the casing, an annular nozzle carrier rotatably fitted on the projection, a plurality of nozzles of different capacities fitted on the carrier, the projection having independent gas and oxygen supply ducts and having a coaxial extension exterior of the casing, gas and oxygen pipes communicating with the ducts, and a turning plug fitted in the extension and having independent openings arranged to simultaneously register with the respective ducts.

8. A blow pipe of the type set forth including a mixing chamber, means for supplying oxygen and gas thereto in proper proportions, a casing fitted exteriorly on the shell of the mixing chamber, a rotary nozzle carrier disposed in the casing, a plurality of nozzles of different capacities arranged radially on the carrier each nozzle being capable of being positioned adjacent the flame end of the mixing chamber, and an oxygen supply pipe terminating in a duct which is arranged to communicate with the nozzle positioned adjacent the flame end of the mixing chamber.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HEINRICH KNAPP.

Witnesses:
ERNST EBERHARDT,
HANNS KLUMICH.