

June 3, 1952

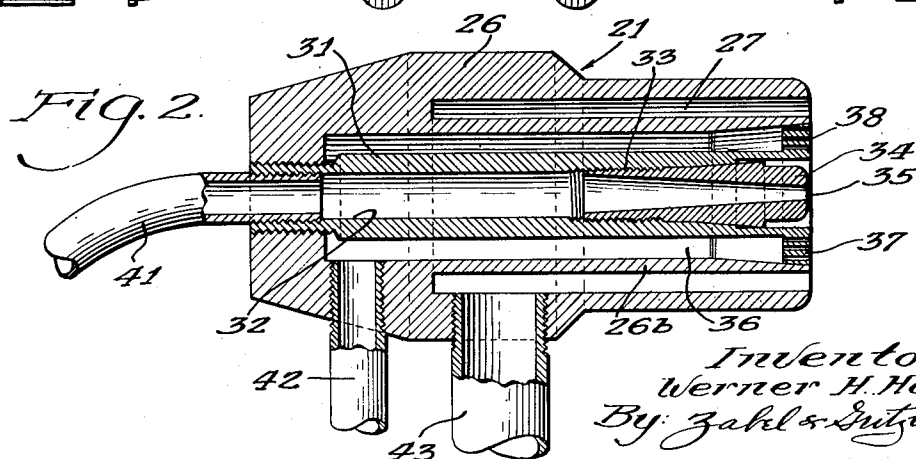
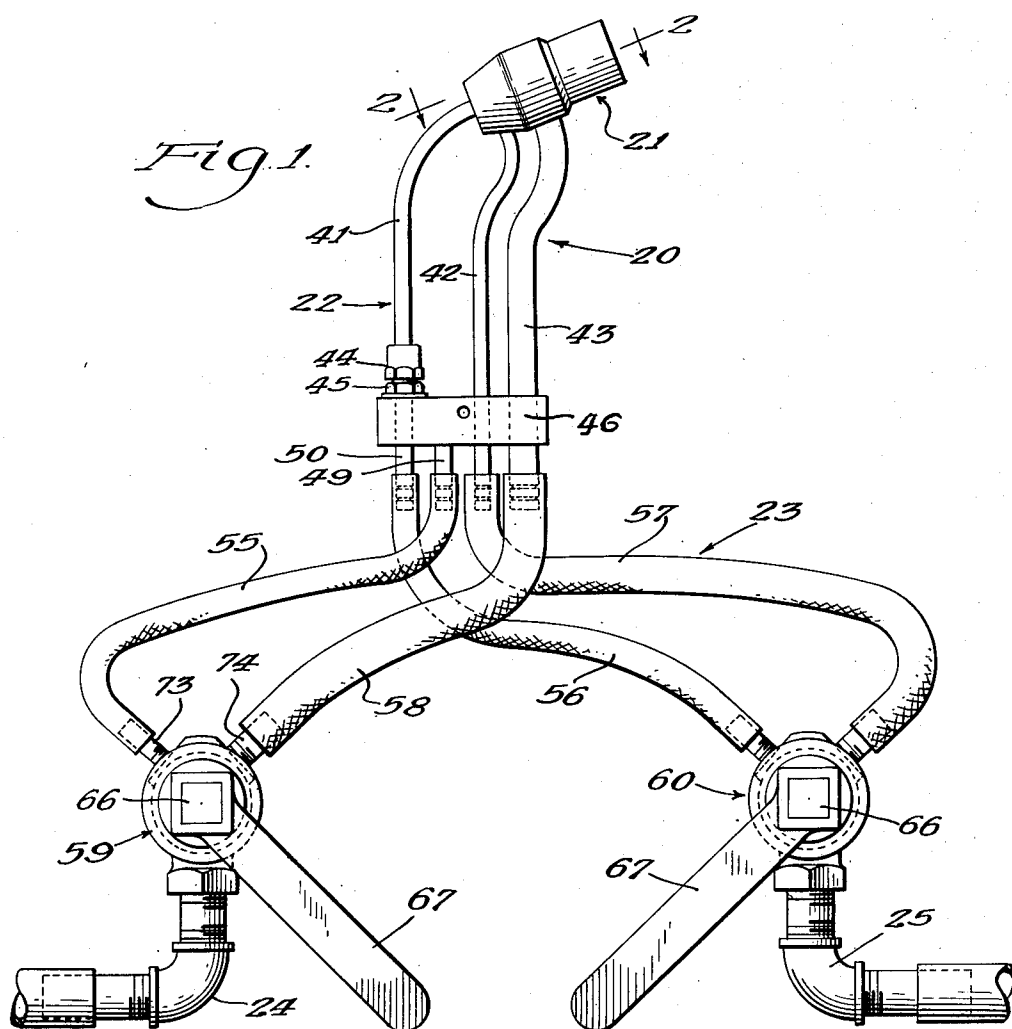
W. H. HAAK

2,598,787

TORCH WITH CONCENTRIC GAS, OXYGEN, AND MIXTURE OUTLETS

Filed July 10, 1948

3 Sheets-Sheet 1



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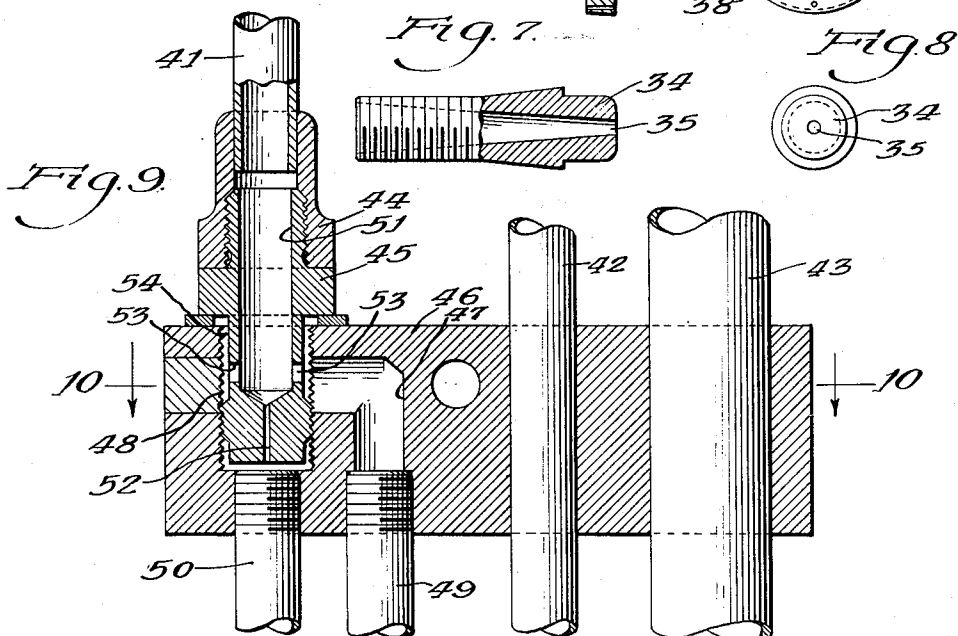
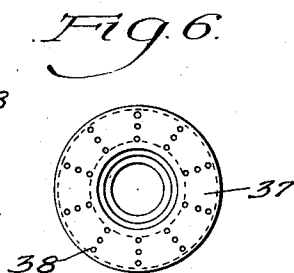
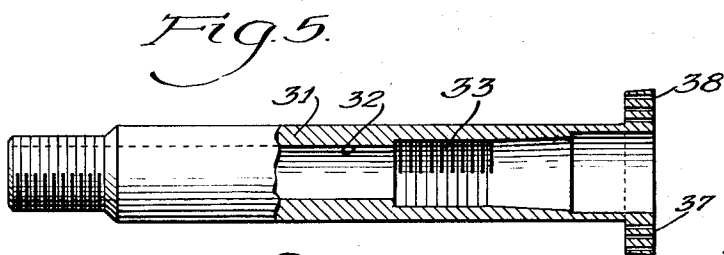
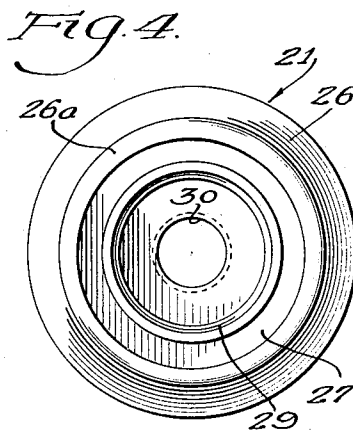
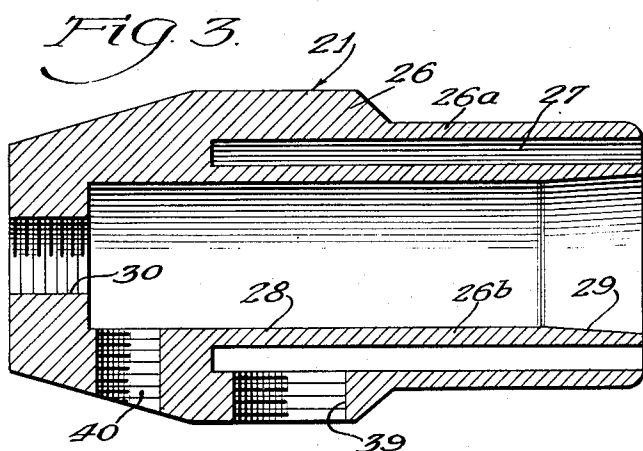
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TORCH WITH CONCENTRIC GAS, OXYGEN, AND MIXTURE OUTLETS

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3 Sheets-Sheet 2



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TORCH WITH CONCENTRIC GAS, OXYGEN, AND MIXTURE OUTLETS

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3 Sheets-Sheet 3

Fig. 10.

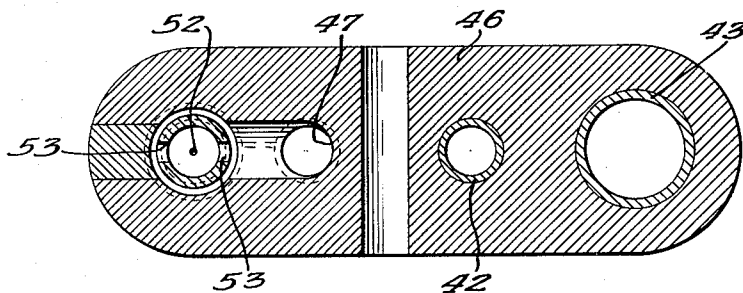


Fig. 11.

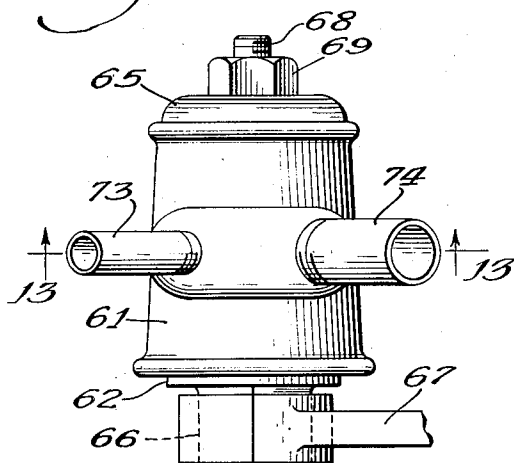


Fig. 12.

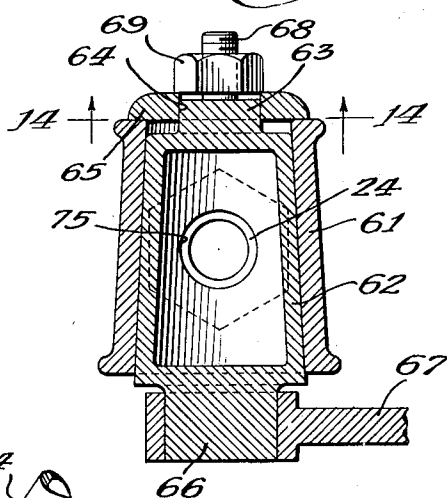


Fig. 13.

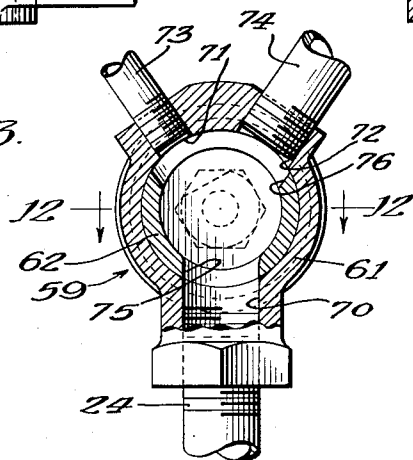
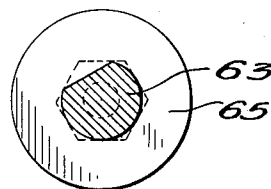


Fig. 14.



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UNITED STATES PATENT OFFICE

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TORCH WITH CONCENTRIC GAS, OXYGEN,
AND MIXTURE OUTLETS

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Application July 10, 1948, Serial No. 38,069

2 Claims. (Cl. 158—27.4)

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The present invention relates to a glass blowing torch and as one of its objects is intended to provide a practical torch that will produce the greatest range of flame size varying from a small needle point flame to a large bushy flame of a type capable of softening Pyrex tubing up to 100 mm. in diameter. The present torch also provides a large annealing flame. Such a torch is designed to operate with oxygen and natural, mixed or artificial gases at pressures below about two pounds per square inch. The torch forming the subject matter of the present invention is intended to produce temperatures over most of its range of operation that will readily fuse quartz. All of this is accomplished with a device that is extremely easy to operate so as to permit the glass blower to give his entire attention to his work. The present torch is silent in its operation throughout its entire range.

Thus it is an object of the invention to provide a torch that possesses all of the foregoing characteristics and will accomplish all of the foregoing objects.

Other objects and advantages in addition to those specifically set forth will become apparent from the following description and the drawings, in which

Fig. 1 is a more or less diagrammatic side elevational view of a complete torch assembly embodying the present invention;

Fig. 2 is an enlarged, longitudinal, sectional view taken through the torch head illustrated in Fig. 1;

Fig. 3 is an enlarged, longitudinal sectional view of the outer shell of the torch head shown in Fig. 1;

Fig. 4 is an end elevational view of the outer shell shown in Fig. 3;

Fig. 5 is a longitudinal, sectional view shown partly in elevation of the intermediate jet member;

Fig. 6 is an end elevational view of the intermediate jet member shown in Fig. 5;

Fig. 7 is a longitudinal sectional view shown partly in end elevation of the central or inner jet member;

Fig. 8 is an end elevational view of the jet member shown in Fig. 7;

Fig. 9 is an enlarged, vertical, longitudinal sectional view taken through the mixing chamber illustrated in Fig. 1, the view being shown partly in elevation;

Fig. 10 is a longitudinal sectional view through a mixing chamber, the view being taken along the line 10—10 of Fig. 9;

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Fig. 11 is an enlarged side elevational view of one of the distributing valves shown in Fig. 1;

Fig. 12 is a vertical, transverse, sectional view taken through the valve, the view being taken along the line 12—12 of Fig. 13;

Fig. 13 is a horizontal, transverse, sectional view through the valve, the view being taken along the line 13—13 of Fig. 11; and

Fig. 14 is a horizontal sectional view taken through the valve, the view being taken along the line 14—14 of Fig. 12.

For purposes of illustration a single embodiment of the present invention has been selected and will be described hereinafter. It is recognized, of course, that many other embodiments of the present invention will occur to the man skilled in the art and it is recognized that the present embodiment may be so modified or altered without departing from the intended scope and spirit of the invention.

Referring now to the drawings the invention is illustrated in the form of a torch generally indicated at 20 that includes a torch head generally indicated at 21 that is fed by a plurality of tubes generally indicated at 22. These tubes 22 are generally rigid and may be made of copper tubing or the like and in turn are connected to flexible tubing 23 of rubber or like material to a gas pipe 24 and an oxygen supply pipe 25. The gas pipe 24 may be connected to a source of natural or artificial gas or mixture thereof whereas the oxygen supply pipe 25 may be connected to a tank or other suitable source of oxygen.

Referring now to Fig. 2 the torch head 21 comprises an outer shell 26 best shown in Figs. 2 and 3 that includes a cylindrical passage therein indicated at 27. This cylindrical passage 27 is formed by the outer cylindrical wall 26a of the shell 26 and an inner cylindrical wall 26b of the shell that is spaced from the outer wall 26a. The inner cylindrical wall 26b also forms an inner passage 28 that is elongated to extend throughout substantially the entire length of the torch head 21 and is flared as at 29. The rear wall of the torch head 21 is provided with a threaded aperture 30 into which is threaded as shown in Fig. 2 an intermediate cylindrical jet member 31 that is hollow to provide a passage 32 throughout its entire length. The inner wall of the intermediate jet member 31 is threaded as at 33 to receive the threaded end of an inner or central jet member 34 shown in Figs. 2 and 7. The inner wall of the inner jet member 34 converges

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toward the outer end of the member so as to form a relatively small orifice or jet area 35.

As can be noted in Fig. 2 the cylindrical wall of the intermediate jet member 31 is spaced from the cylindrical wall 26b of the outer shell 26 so as to provide therebetween an intermediate annular passage 36 that extends throughout substantially the entire length of the torch head 21. The outer end of the intermediate torch member 31 is flanged as at 37 so as to close the open end of the intermediate annular passage 36 and this flange 37 is provided with radially disposed apertures 38 shown in Figs. 2, 5 and 6.

The outer shell 26 of the torch head 21 is apertured as at 39 (see Fig. 3) to provide communication with the outer annular passage 27 and again at 40 to provide communication with the inner passage 28 of the outer shell 26. As best shown in Fig. 2 this latter aperture 40 provides communication with the intermediate annular passage 36. Each of the apertures 30, 40 and 39 is threaded to receive the threaded end of tubes 41, 42 and 43 respectively which make up the plurality of tubes indicated in Fig. 1.

As best shown in Figs. 1 and 9 the tube 41 is connected to a coupling member 44 that is threaded onto a nipple 45 that projects outwardly from a mixing chamber 46. This mixing chamber 46 is provided with a pair of passages 47 and 48, the latter of which is threaded to receive the lower threaded end of the nipple 45. Passage 47 communicates with passage 48 as best shown in Fig. 9 and its lower end is threaded to receive a pipe segment or tube segment 49. The lower end of passage 48 is threaded to receive the threaded end of a pipe or tube segment 50. The nipple 45 is provided with a passage 51 extending substantially throughout its entire length that merges at its lower end into a passage 52 having a relatively small cross sectional area. Radial passages 53 extend through the wall of the nipple 45 adjacent to the lower end of the passage 51 and communicate with an annular chamber 54 that is formed between the wall of the nipple 45 and the wall of passage 48 formed in the mixing chamber 46.

To the tube segments 49 and 50 respectively are attached flexible tubes 55 and 56 respectively. Tubes 42 and 43 pass through the mixing chamber 46 as best shown in Figs. 1 and 9 and to their free ends are attached flexible tubes 57 and 58. Mounted on the end of gas pipe 24 is a distributing valve generally indicated at 59 and on the end of oxygen pipe 25 is a distributing valve generally indicated at 60.

As best shown in Figs. 11 to 14 inclusive each of the distributing valves 59 and 60 comprises a cylindrical shell 61 in which is mounted for rotation a rotatable valve member or plug 62 that is provided with a boss 63 at one end that is held in an aperture 64 in the end wall 65 of the distributing valve 59 or 60 and a boss 66 on the other end on which is attached a manually operated lever 67. The free end of the boss 63 provides a threaded shank portion 68 on which is threaded a nut 69 that holds the assembly together.

As shown in Figs. 11 and 13 the wall of the shell 61 is provided with a radial passage 70 that is threaded to receive the threaded end of the gas pipe 24 (or oxygen pipe 25 in the case of valve 60). The wall of shell 61 is further apertured as at 71 and 72 to receive threaded pipe segments 73 and 74 respectively to the free end of which are secured the flexible tubes 55 and 58 respec-

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tively. The movable valve member of plug 62 is similarly apertured as at 75 and 76 as best shown in Fig. 13, aperture 75 corresponding substantially with the size and location of aperture 70 and aperture 76 corresponding to the position of apertures 71 and 72, but being of a sufficient size to span both apertures and capable of being aligned therewith as best illustrated in Fig. 13. By rotating the movable valve member 62 in either clockwise or counterclockwise direction as viewed in Fig. 13, it can be readily seen that the passage 70 in shell 61 of the valve may be partially or fully closed depending upon the direction of rotation of the movable valve member 62. The valve member 62 with its aperture 75 and the apertures 70 and 71 are all so proportioned with respect to each other that the valve member 62 may be rotated to preclude the flow of oxygen or gas into the selected conduit as desired. Thus it is possible by manipulation of either valve 59 or 60 to regulate the gas or oxygen flow through the various tubes 55, 58, 56 and 57.

By referring to Figs. 1 and 2 it can be seen that passage 32 (Fig. 2) in the torch head 21 communicates with the mixing chamber formed in the nipple 45 (Fig. 9) of the mixing chamber member 46 so that this passage 32 and hence the central or inner torch member 34 is provided with a mixture of gas and oxygen which is mixed prior to its reaching the orifice 35 of the central torch member. The intermediate annular passage 36 is fed through tubes 42 and 23 with oxygen from the oxygen supply pipe 25, whereas the outer annular chamber 27 is provided with gas through tubes 43 and 58 from the gas line indicated at 24. Thus at the outer or burning end of the torch head 21 oxygen is emitted through the radial apertures 38 from the intermediate annular chamber 36 and gas is emitted from the outer annular chamber 27 which mixes with the oxygen passing through apertures 38 to form a combustible gas at the surfaces of the burner or torch head.

By proper manipulation of valves 59 and 60 it is possible to provide on the one hand, a very fine needle point flame issuing from the central jet 35 at a time when the gas and oxygen supply is entirely shut off through the intermediate chamber 36 or the outer annular chamber 37. On the other hand, it is possible to provide a large bushy flame with the central jet 35 shut off and with oxygen and gas mixing and burning just outside the intermediate chamber 36 and the outer annular chamber 27. It is also possible to provide a flame made up of a combination of all burners, under which conditions the pre-mixed gases issuing from the central burner opening 35 is burning at the same time that a flame is being produced adjacent to the torch end of passages 36 and 27.

Thus there is provided a very flexible torch head and assembly that accomplishes the objective set forth herein. No booster is required to increase the pressure of the gases when using the present torch because only a relatively small portion of the gas and oxygen is pre-mixed. For the larger flame surface combustion is utilized.

It is, of course, recognized that a pair of torches for cross-fire operation can be utilized to advantage.

I claim:

1. A torch of the class described comprising a central unobstructed passage means providing a relatively small orifice disposed on the longi-

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tudinal center line of the torch, and intermediate and outer annular passage means disposed concentrically about the central orifice, the intermediate annular passage at the face of the torch being broken up into a multitude of small passages, and the outer annular passage being entirely unobstructed throughout its circumference, means providing a mixing chamber communicating with the central passage, means providing an oxygen inlet passage and a gas inlet passage in the mixing chamber, gas inlet passage means communicating with the outer annular passage and oxygen inlet passage means communicating with the intermediate annular passage.

2. A torch of the class described comprising a central unobstructed passage means providing a relatively small orifice disposed on the longitudinal center line of the torch, and intermediate and outer annular passages disposed concentrically about the central orifice, the intermediate annular passage at the face of the torch being broken up into a multitude of small passages and the outer annular passage being entirely unobstructed throughout its circumference, means providing a mixing chamber communicating with the central passage, oxygen inlet passage means and gas inlet passage means in the mixing cham-

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ber, gas inlet passage means communicating with the outer annular passage and oxygen inlet passage means communicating with the intermediate annular passage, a distributing valve for the two gas inlet passages, and a distributing valve for the two oxygen inlet passages.

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REFERENCES CITED

10 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
985,896	Hopkins	Mar. 7, 1911
1,142,355	Mueller	June 8, 1915
1,617,166	Schoop	Feb. 8, 1927
1,800,616	Forster	Apr. 14, 1931
1,808,968	Plumley	June 9, 1931
1,865,905	Hammon	July 5, 1932
1,973,371	Charles et al.	Sept. 11, 1934
2,054,601	Jenkins	Sept. 15, 1936
2,134,169	Wright	Oct. 5, 1938
2,210,402	Gaines	Aug. 6, 1940
2,367,316	Skinner	Jan. 16, 1945
2,376,413	Babcock	May 22, 1945
2,397,165	Shepherd	Mar. 26, 1946