Jan. 8, 1957 J. H. BEDDOES ET AL 2,776,526

BURNERS FOR REHEATING STEMWARE

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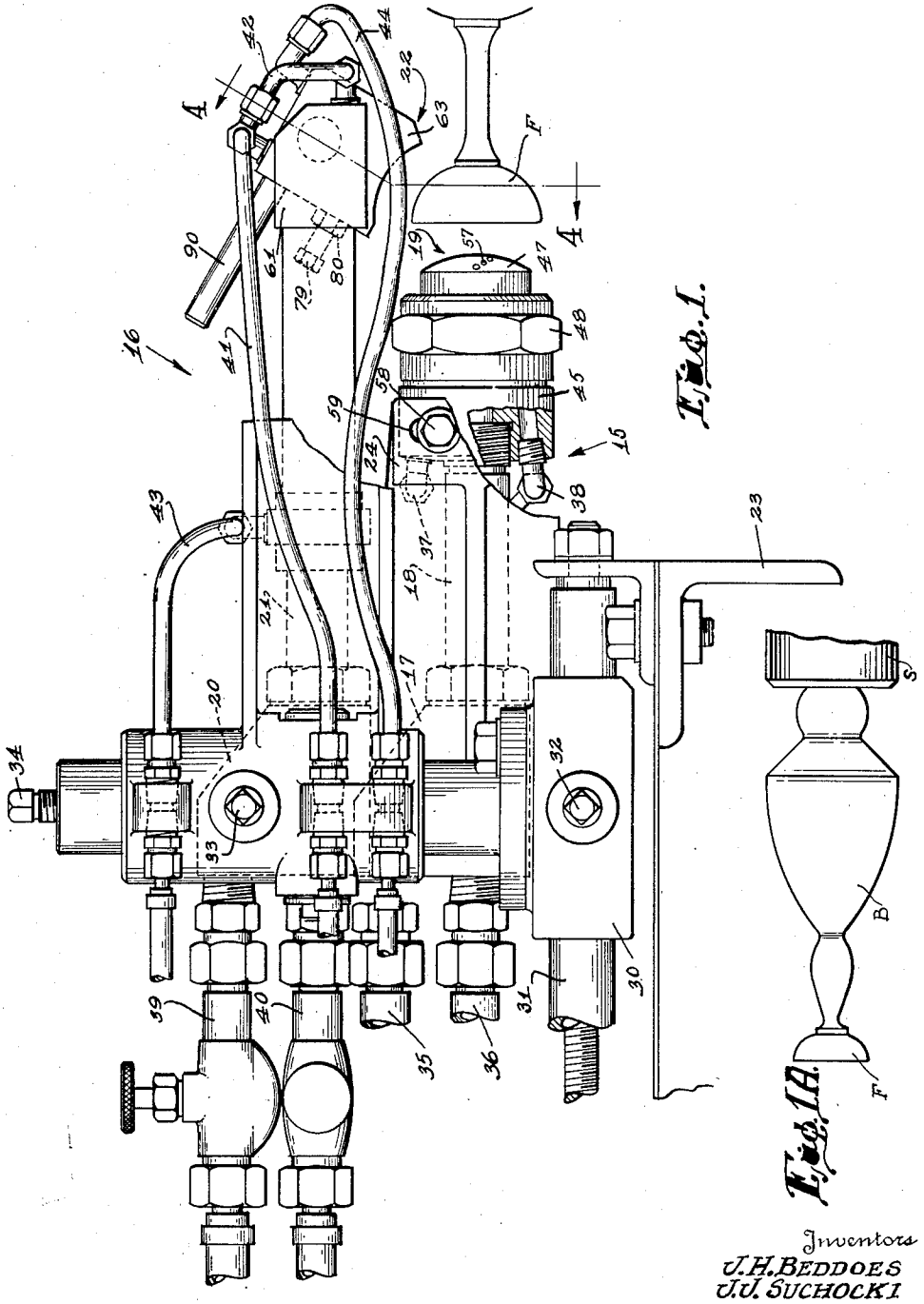


Fig. 1.

Fig. 1A.

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Fig. 2.

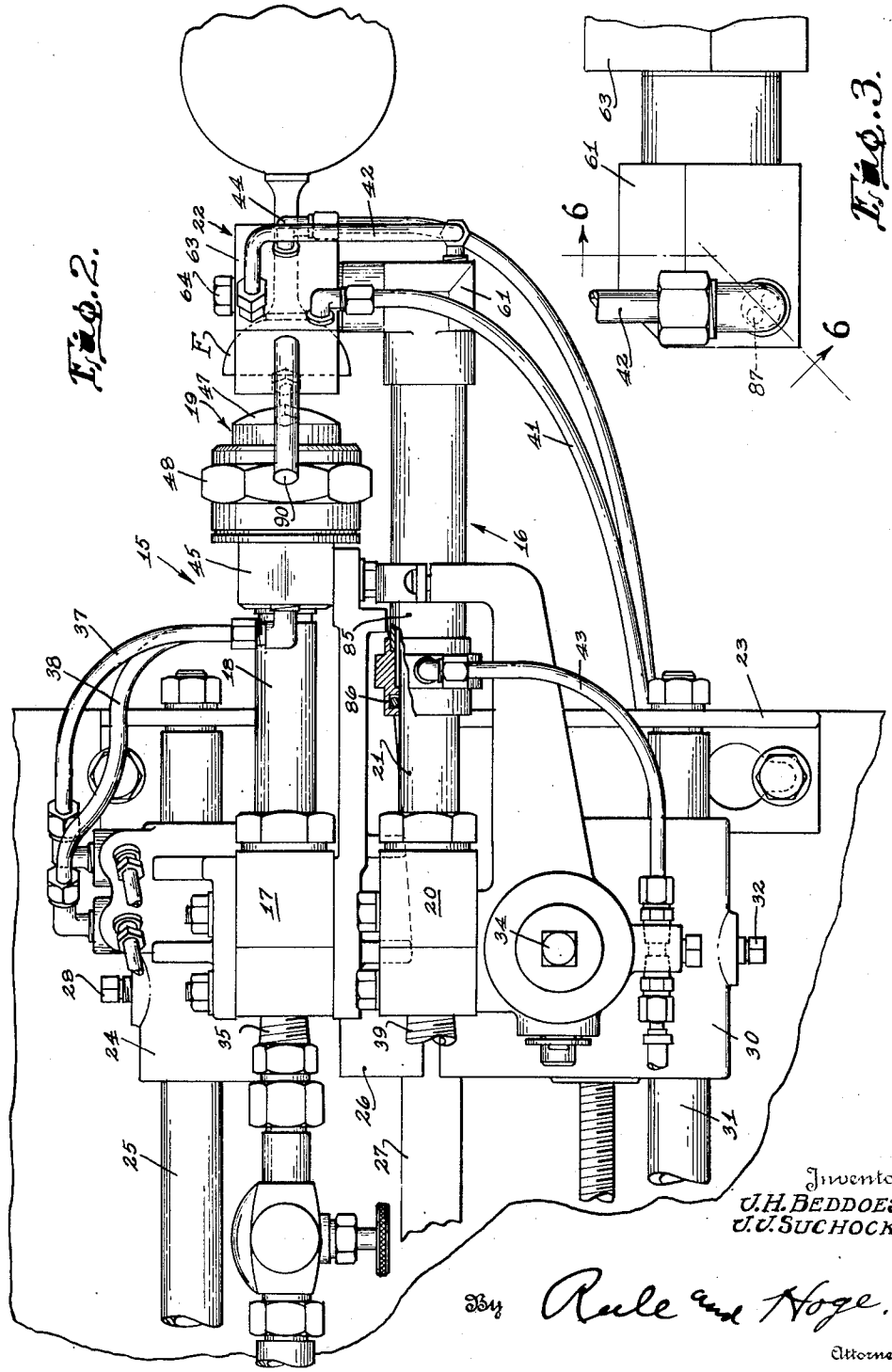


Fig. 3.

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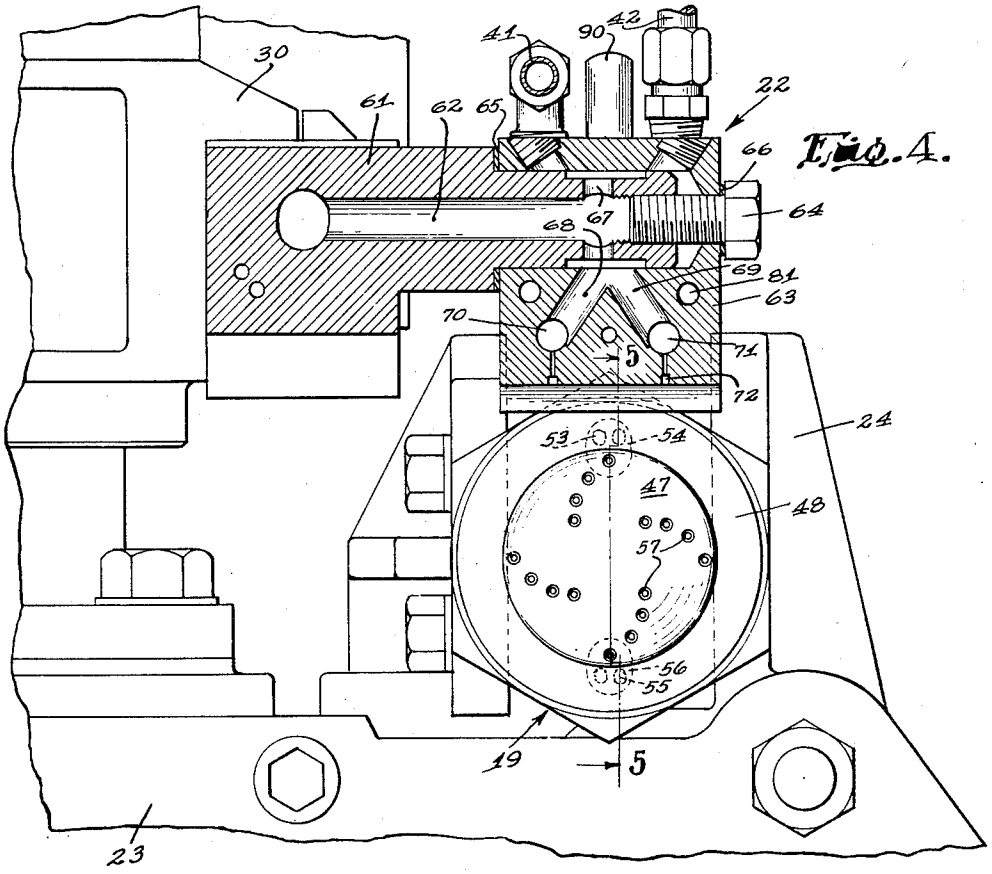


Fig. 4.

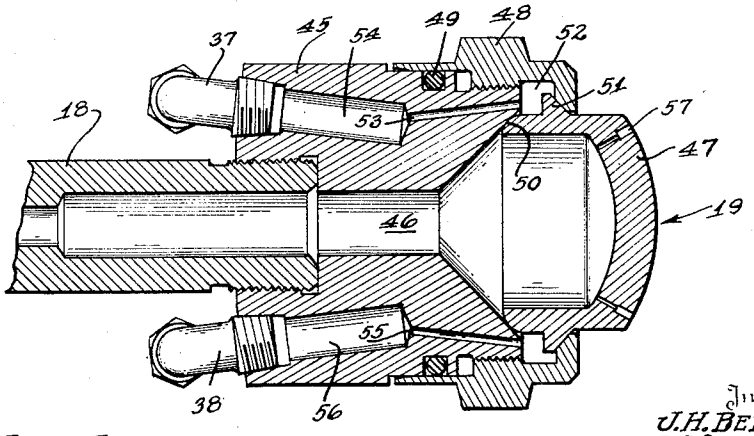


Fig. 5.

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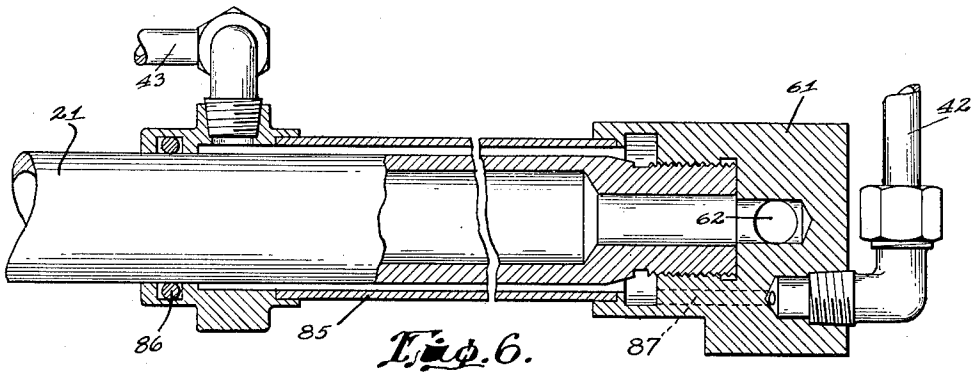


Fig. 6.

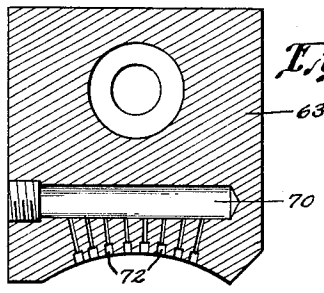


Fig. 7.

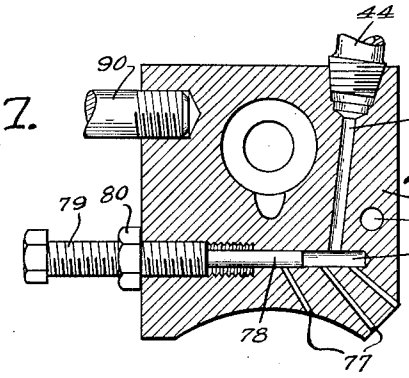


Fig. 8.

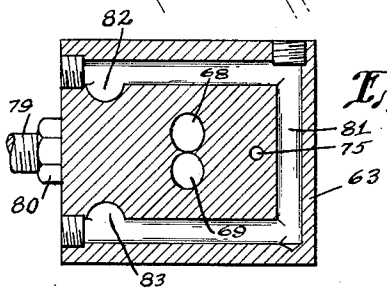


Fig. 9.

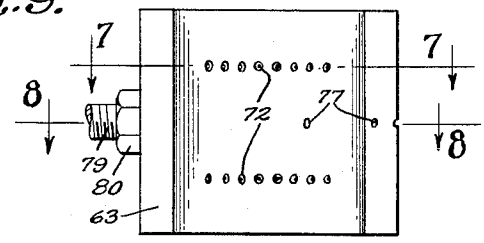


Fig. 10.

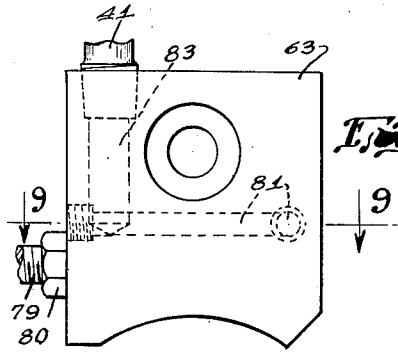


Fig. 11.

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United States Patent Office 2,776,526 Patented Jan. 8, 1957

2,776,526

BURNERS FOR REHEATING STEMWARE

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Application August 1, 1951, Serial No. 239,684

3 Claims. (Cl. 49—58)

This invention relates to the forming of glassware such as footed tumblers or stemware and particularly to burners for reheating the supporting foot or base on glass stemware prior to reshaping.

It is currently the practice to produce footed tumblers in successive steps; the hollow glass bowl is formed first and the foot or footed stem is then cast on the bowl by pressing or molding, leaving the foot in the shape of a cup inverted with respect to the bowl. The cup-shaped foot is then reheated to soften the glass and reshaped to form a symmetrical base.

It is an object of this invention to provide a new and improved burner apparatus for reheating the supporting foot prior to reshaping.

It is a further object of this invention to provide such an apparatus which will heat the foot uniformly and sufficiently for reshaping without producing cold spots or hot spots which form blisters on the surface of the glass or which boil the glass.

Another object of this invention is to provide such an apparatus which will effectively heat the cup-shaped foot without heating the stem to a point where it will be distorted or marred upon reshaping of the cup.

Another object of the invention is to provide such an apparatus which will be efficient and economical.

Other objects of the invention will appear hereinafter.

Basically, the invention comprises a burner for directing flames onto the interior surface of the cup-shaped foot and a second burner for directing flames onto the exterior surface of the cup-shaped foot. Each of the burners is especially designed and constructed to accomplish the objects set forth above.

Referring to the accompanying drawings:

Fig. 1 is an elevational view of the burner assembly mounted in position for reheating the foot, parts of the apparatus being broken away;

Fig. 1A is a detail view showing a tumbler and the spindle by which it is rotatably supported;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a fragmentary end view of the upper burner assembly;

Fig. 4 is a sectional view at the line 4—4 on Fig. 1;

Fig. 5 is a sectional view at the line 5—5 on Fig 4;

Fig. 6 is a sectional view at the line 6—6 of Fig. 3;

Fig. 7 is a sectional view at the line 7—7 on Fig. 10;

Fig. 8 is a sectional view at the line 8—8 on Fig. 10;

Fig. 9 is a sectional view at the line 9—9 on Fig. 11;

Fig. 10 is a plan view of the underside of the upper burner; and

Fig. 11 is a side view of the same.

Referring to Figs. 1 and 2, a lower circular burner assembly **15** is provided for directing flames onto the interior surface of the cup-shaped foot F. An upper rectangular burner assembly **16** is provided for directing flames onto the exterior surface of the cup-shaped foot F.

The lower circular burner assembly **15** comprises a mixing block **17**, fuel tube **18**, and burner **19**. The upper

rectangular burner assembly **16** similarly comprises a mixing block **20**, fuel tube **21** and burner **22**.

As further shown in Figs. 1 and 2, the burner assemblies are mounted on a frame **23**. The circular burner assembly is supported by a bracket **24**, slidably mounted on a rod **25** in the frame **23** and a bracket **26** sliding on a crossbar **27** supported by the frame **23**. The position of the burner assembly **15** may be adjusted laterally by loosening a lock nut **28** on the bracket **24** and sliding the bracket and burner assembly to the desired position. Minor vertical adjustments in the position of the circular burner assembly may be made by loosening a bolt **58** which holds the front part of the burner assembly on the bracket **26** through an elongated slot **59** and then moving the burner assembly.

The rectangular burner assembly **16** is supported by a bracket assembly **30** slidably mounted on rod **31** and crossbar **27**. The position of the rectangular burner assembly may be adjusted laterally by loosening a lock nut **32** and sliding the bracket assembly **30** to the desired position. The rectangular burner assembly may be adjusted vertically by loosening a lock nut **33** and rotating adjusting nut **34** to move the burner assembly to the desired position.

Fuel is supplied to the mixing block **17** of the circular burner assembly **15** through fuel lines **35** and **36** (Fig. 1). A cooling fluid is also supplied to the burner assembly **15** to cool the burner, as hereinafter described, through lines **37** and **38**.

Fuel is supplied to the mixing block **20** through fuel lines **39** and **40**. Cooling fluid is supplied to the rectangular burner assembly through lines **41**, **42** and **43**. In addition, air is supplied to the rectangular burner, for reasons hereinafter described, through a line **44**.

Referring to Fig. 5, the circular burner **19** comprises a burner body **45** threaded onto the end of the fuel tube **18** and provided with an opening **46** connected to the opening of the fuel tube. The end of the opening **46** is enlarged and frusto-conical in shape. A nozzle tip **47** having a convex exterior surface is mounted on the end of the body adjacent the frusto-conical opening and held in position thereon by a lock nut **48** and sealing gasket **49**.

As shown in Fig. 5, the body **45**, tip **47**, and sealing nut **48** are so constructed and arranged as to form an annular channel **52**, surrounding the tip **47** and adjacent to portions of the body **45** and sealing nut **48**. This annular channel **52** is connected to the cooling fluid lines **37** and **38** through passageways **53**, **54** and **55**, **56**, respectively. A gas and liquid-tight seal is insured between the interior of the burner and the annular channel **52** by annular sealing surface **50**. A liquid and air-tight seal is insured between the annular channel **52** and the outside air by annular sealing surface **51**.

The nozzle tip **47** is provided with a multiplicity of ports or openings **57** (Figs. 4 and 5) arranged in such a manner that the flames emanating therefrom are isolated from each other and do not merge prior to contact with the surface of the foot. Such an arrangement is desirable and preferred in order to prevent excessively hot spots on the surfaces of the foot which would cause boiling or blistering of the glass surface. The ports **57** as shown in Fig. 5 extend outwardly from the fuel chamber in divergent directions.

The cooling fluid, such as water, is circulated to cool the burner through the line **38** (Fig. 5), passageways **55**, **56** around the annular channel **52** and out through the passageways **53**, **54** to the line **37**. By this construction, the tip **47**, body **45**, and sealing nut **48** are all cooled in order to prevent overheating of the burner and maintain the burner at a uniform temperature. Such cooling, in turn, aids in maintaining constant combustion condi-

tions in the burner and enables the burner to provide a more uniform flame resulting in a higher efficiency.

As shown in Figs. 1 and 2, the fuel tube 21 of the rectangular burner extends parallel to that of the circular burner and has an angle block 61 on the end thereof. The angle block is provided with a channel 62 (Fig. 4) which extends to the burner 22 and transmits the fuel to the burner. The burner 22 comprises a rectangular burner block 63 which engages with a reduced portion of the angle block 61 and is prevented from rotation thereon by a bolt 64. A gas-tight seal is insured by washers 65 and 66. The fuel passes from the opening 62 in the angle block through a transverse opening 67 in the reduced portion of the angle block to the various openings and ports of the burner block 63, as presently described. Minor adjustments in the position of the burner 22 may be made by loosening the bolt 64 and moving the burner block 63 by a handle or rod 90 attached to the burner block.

As further shown in Fig. 4, the block 63 is provided with angular channels 68 and 69 which lead to transverse passages 70 and 71. A series of openings or ports 72 extend from each of the passages 70 and 71 to the face of the burner block as shown in Figs. 4 and 7. The under face of the burner block 63 is concave (Figs. 7, 8, and 11). The openings 72 are arranged in parallel rows spaced at a predetermined distance on either side of the center line of the burner block face.

By such an arrangement, two flame zones are provided separated by an air zone extending along the center of the burner face. When the burner is in position to heat the exterior surface of a foot (as shown in Fig. 2) the two flame zones effectively "straddle" and do not impinge upon the base of the stem of the glassware, thereby preventing overheating and subsequent marring or distorting of the shape of the stem.

Further provision is also made for preventing overheating of the base of the stem by projecting air against the stem to maintain it at a low temperature. As shown in Fig. 8, this includes a channel 75 extending downwardly through the block to transverse channel 76 and in turn to radial openings 77. Air supplied to these channels is projected against the stem of the glassware. Means is provided for adjusting the amount of air and comprises a rod 78 operating in the transverse channel 76 and connected to bolt 79. Lock nut 80 maintains the bolt 79 in the desired position.

The means for cooling the rectangular burner block includes a peripheral channel 81 connected to the fluid lines 41 and 42 by channels 82 and 83 (Figs. 9 and 11). The cooling fluid is circulated through the block by entering through line 41 and passing through channel 83 and around the peripheral channel to channel 82 and leaving through line 42.

Inasmuch as the fuel tube of the upper burner projects beyond the end of the circular burner, there is a tendency for it to become heated by the heat of the flame from the lower burner. Provision is therefore made for cooling a portion of the fuel tube 21 of the upper burner. As shown in Fig. 6, this comprises a jacket 85 surrounding the end of the fuel tube 21. The ends of the jacket are sealed by the angular block 61 and a sealing ring 86 respectively. The cooling fluid after leaving the rectangular block of the upper burner through the line 42, enters the angular block 61 and passes by means of a small passageway 87 to the jacket 85 and thence out through the line 43.

Referring to Fig. 1A, the tumbler is supported by the spindle S attached to the bowl B of the tumbler. The spindle may be rotated in a conventional manner as, for example, that disclosed in the patent to Schutz 2,289,999, July 14, 1942, Glass Working Machine.

The operation of the apparatus may be summarized as follows:

The cup-shaped supporting foot F of the continuously rotating tumbler is brought into position so that the stem

is in alignment with the axis of the lower circular burner and the burner directs flames onto the interior surface of the foot. The upper burner simultaneously directs flames against the exterior surface of the foot, the flames emanating therefrom in two flame zones separated by a free air zone. The base of the stem is thus "straddled" preventing overheating thereof. The burner may be adjusted to project cooling air against the base of the stem in order to further aid in preventing overheating of the stem.

Each of the burners is provided with cooling means to prevent overheating thereof and thereby aid in maintaining constant combustion conditions and high efficiency.

We have thus provided a burner construction which is particularly adapted for uniformly heating the supporting foot of glass stemware prior to reshaping thereof. The burner construction is such that an efficient and economical heating of the foot is effected.

Modifications may be resorted to within the spirit and scope of the appended claims.

We claim:

1. An apparatus for reheating the cup shaped supporting foot on glass stemware prior to reshaping thereof comprising a burner provided with a multiplicity of ports for directing flames onto the interior surface of said supporting foot, means for supporting an article of glass stemware with its axis in alinement with the axis of the burner, a second burner provided with a multiplicity of ports for directing flames onto the exterior surface of the supporting foot, said second burner being mounted with its axis and the outlet ports for the flames at an acute angle with the stem of the glassware, the flames thereby being directed away from the stem, the ports in said second burner being so arranged that the flames emanating therefrom form parallel sheets of flame on either side of the axis of the stem.

2. An apparatus for reheating the cup shaped supporting foot on glass stemware prior to reshaping thereof comprising a first burner provided with a multiplicity of ports for directing flames onto the interior surface of said supporting foot, a fuel tube for directing the fuel to the said first burner, means for supporting an article of glass stemware with its axis in alinement with the axis of the said first burner, a second burner provided with a multiplicity of outlet ports for directing flames onto the exterior surface of the supporting foot, a fuel tube for directing the fuel to the second burner, the fuel tube of the second burner being parallel with that of the first burner and extending beyond the end of the first burner, said second burner being mounted with its axis and said outlet ports at an acute angle with the stem of the glassware, the said outlet ports and flames being directed away from the stem, the ports in said second burner being so arranged that the flames emanating therefrom form parallel sheets on either side of the axis of the stem.

3. The apparatus set forth in claim 2, said first burner comprising a body and a circular burner tip mounted on said body and forming therewith a fuel chamber, said tip comprising a front wall formed with a multiplicity of ports extending therethrough from the fuel chamber in divergent directions so that the flames emanating therefrom are directed in separate paths from the burner tip to the points of contact with the interior surface of the cup-shaped foot, thereby preventing the formation of excessively hot spots on the surface of the foot.

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