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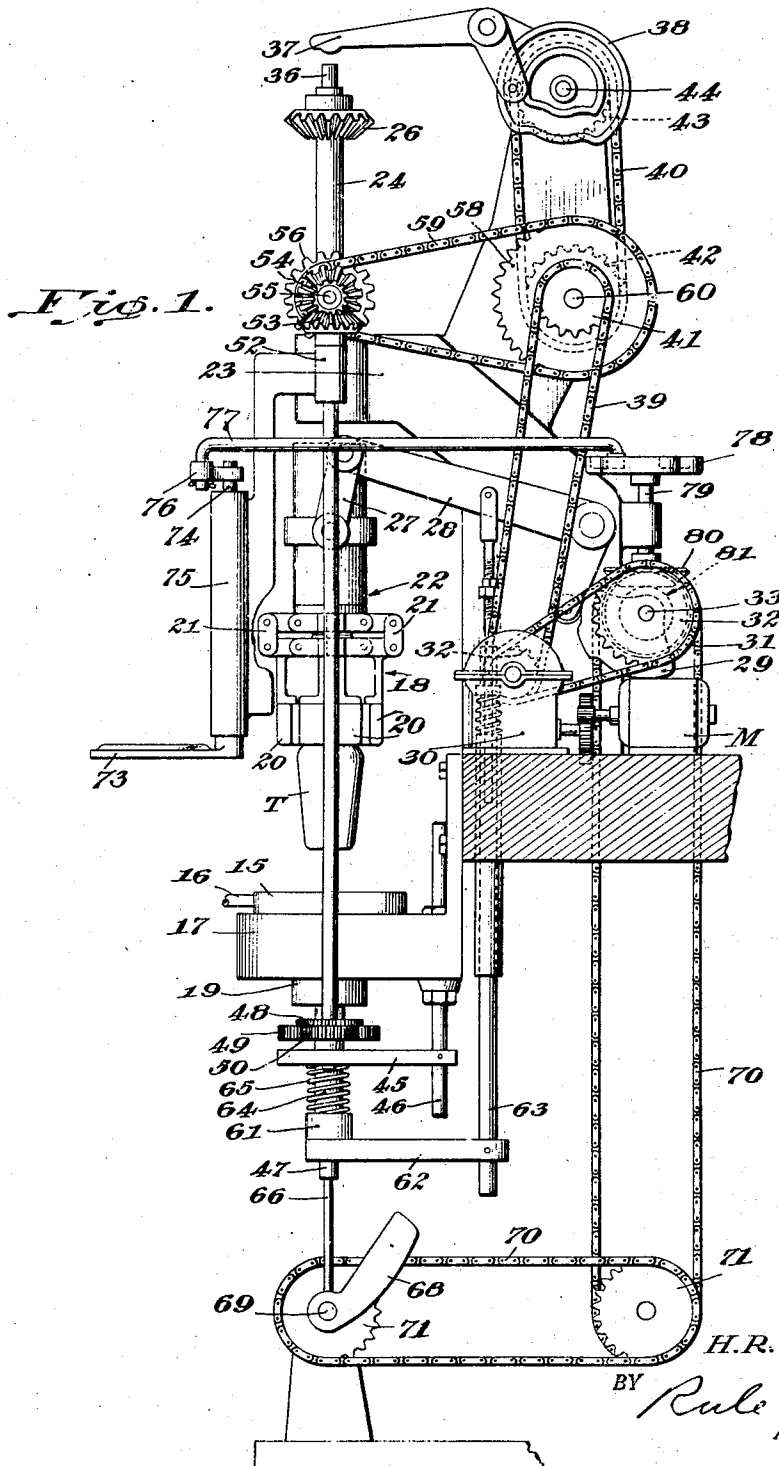
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METHOD OF AND APPARATUS FOR BURNING OFF GLASSWARE

Filed Sept. 30, 1938

3 Sheets-Sheet 1



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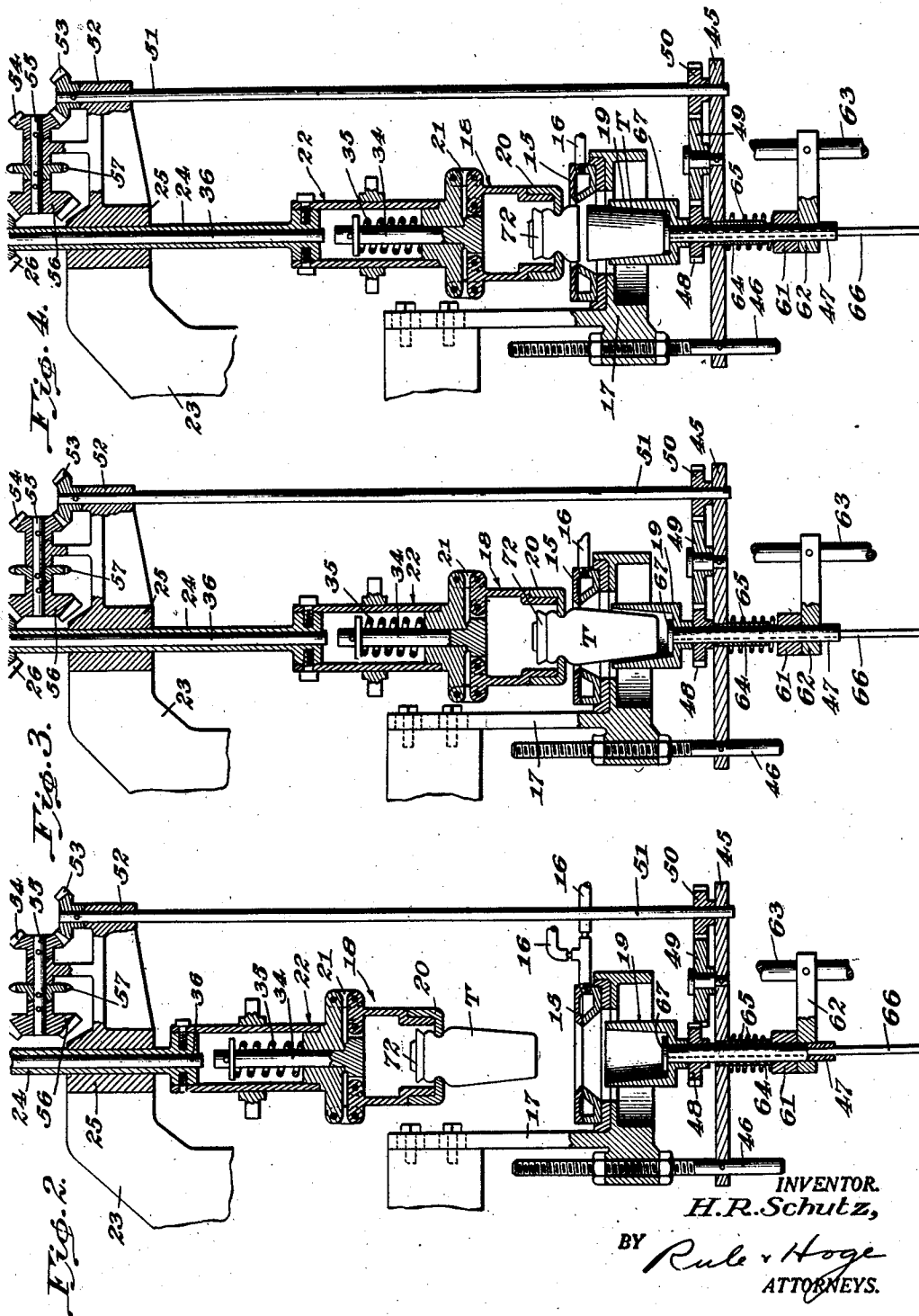
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3 Sheets-Sheet 2



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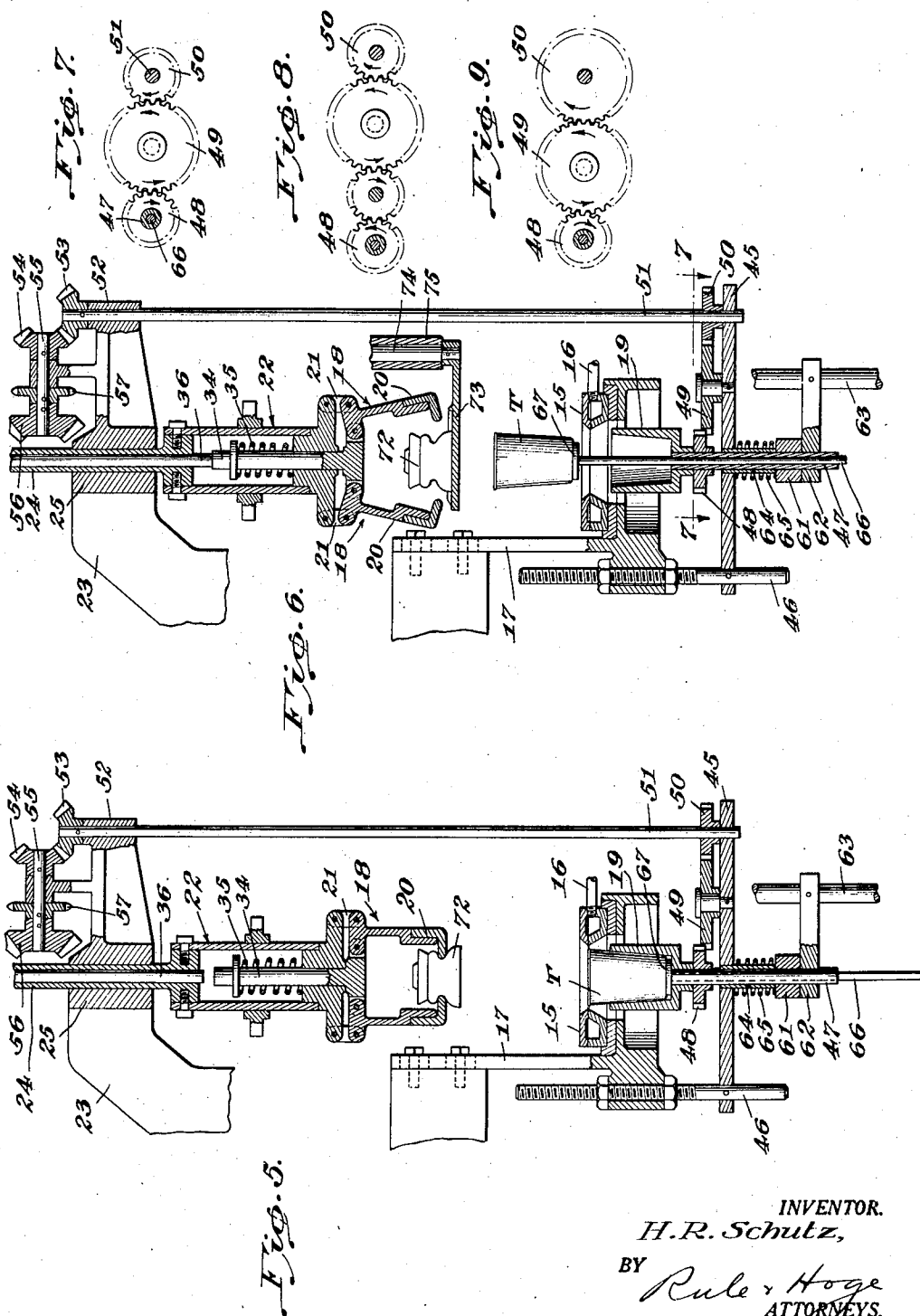
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METHOD OF AND APPARATUS FOR BURNING OFF GLASSWARE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR BURNING
OFF GLASSWAREHarold R. Schutz, Toledo, Ohio, assignor to Libbey
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Application September 30, 1938, Serial No. 232,478

8 Claims. (Cl. 49—50)

The present invention relates to improvements in methods of and apparatus for burning off glassware and is particularly concerned with improving the beaded edge of the well known "Safedge" tumblers.

In the conventional burning-off operation, as it applies to the manufacture of glass tumblers, for example, the moile drops away from the tumbler as it is severed therefrom by the application of an intensely hot flame. Because of the non-uniformity of the wall thickness and consequent uneven distribution of the weight of the article, it seldom separates uniformly from the article. This frequently results in the formation of small humps or mounds in beads produced by the conventional burnoff method.

An object of my invention is to completely overcome the above objection and to this end, provides for inversion of the glass units from the position above described, so that the tumbler or other article is lowermost with respect to the moile. Because the tumbler or other article is generally uniform in all respects, it will separate from the moile substantially simultaneously at all points throughout its circumference with the proper application of heat to the glass at the juncture of the moile and article, and produce a uniform regular bead.

Another object of my invention is to generally improve the finish and formation of the bead by rotating the tumbler and moile at relatively different speeds, or in opposite directions approximately at the time of separation thereof; to limit the distance of initial separation of the moile and tumbler and to subject the beaded edge to the influence of the severing flame for a short period of time subsequent to severance of the tumbler from the moile, whereby to smooth out the surface of the bead and definitely avoid imparting any irregular surface formation thereto.

Other objects will be in part apparent and in part pointed out hereinafter.

In the drawings:

Fig. 1 is a sectional side elevational view of one possible form of apparatus for practicing the method disclosed herein, the operating mechanism in some respects being more or less diagrammatic.

Figs. 2 to 6 inclusive, are sectional elevational views showing the apparatus in a series of different positions to effect the successive steps involved in practicing my method. Fig. 2 shows the tumbler and moile in their initial position. Fig. 3 shows the tumbler and moile in the sev-

ering position in close proximity to the burner. Fig. 4 discloses the manner in which the tumbler drops away from the moile upon completion of the severing operation. Fig. 5 shows the moile raised and the tumbler elevated to subject its upper edge, for a second time, to the influence of the burner. Fig. 6 shows the moile about to be removed and the tumbler elevated to a position for convenient removal.

Fig. 7 is a sectional elevational view taken substantially along the line 7—7 of Fig. 6 showing the gear train which provides for rotation of the tumbler receiving cup at the same speed and same direction as the moile engaging chuck.

Fig. 8 is a view similar to Fig. 7 wherein the train of gears provides for rotation of the tumbler receiving cup in a direction opposite to that of the moile engaging chuck.

Fig. 9 is a view similar to Fig. 7 illustrating a train of gears whereby the cup is rotated at a higher speed than the moile engaging chuck.

In accordance with my invention, the burnoff operation involves placing a glass unit consisting of a tumbler and moile, for example, in a rotary chuck, the tumbler being lowermost with respect to the moile. The chuck is then moved vertically downward to position the moile and tumbler in the effective zone of a burner which applies an intensely hot flame to the glass at the point of juncture of the moile and tumbler. Rotation of the glass unit continues during the entire severing operation. As the flame melts the glass, the tumbler, due to its weight and uniform distribution of glass therein, moves downwardly away from the moile, at a uniform rate of speed at all points in its circumference. At a predetermined point which is approximately three-sixteenths of an inch below the position occupied by the tumbler at the beginning of the severing operation, the tumbler engages a bottom support, a receiving cup for example. This bottom support preferably is rotating continuously at a somewhat higher speed than the chuck or in the opposite direction of the chuck rotation. It has been discovered that relative rotation between the moile and tumbler slightly in advance of complete separation of the tumbler from the moile and for a short period of time thereafter, almost invariably produces a smooth regularly formed bead at the upper edge of the tumbler. Immediately following severance of the moile from the tumbler, the moile is removed from the apparatus and the tumbler is for a second time positioned to subject the bead to the influence of the flame. This is a sort of

fire polishing operation and functions to remove any slight irregularities that might have made their appearance in the bead for one reason or another.

The apparatus illustrated herein for the purpose of practicing the above method, includes a conventional circular burner 15 to which the necessary gases are supplied through pipes 16. This burner 15 is supported upon a bracket 17 in vertical alignment with and between a moile engaging chuck 18 and article receiving cup 19.

The chuck 18 may well be of any preferred construction, the illustrated form thereof consisting of a plurality of jaws 20 which are pivoted through links 21 to the lower end of a tubular carrier 22. This carrier is mounted for rotation and reciprocation in a bracket 23 and for this purpose includes a reduced tubular shaft 24 journaled in a vertical bearing 25 in said bracket 23. A bevel gear 26 mounted upon the upper end of the tubular shaft 24, forms part of a gear train through which rotary motion is imparted to the chuck carrier 22 as will be more apparent hereinafter. Vertical reciprocation of the chuck is effected by mechanism including links 27 which connect the carrier 22 and a bell crank lever 28, the latter having one end operatively engaging a rotary cam 29 which is driven by a motor M through a speed reduction gearing 30, a sprocket chain 31 and sprockets 32, one of the latter being mounted upon a shaft 33 which also carries the cam.

Periodically the jaws 20 are opened and closed for obvious reasons. This is effected through mechanism including a push rod 34 which is disposed coaxially with and within the chuck carrier, having its lower end pivoted to the jaws 20 and its upper portion encircled by a coil spring 35 which functions to yieldingly hold the jaws in contracted position. Expansion or opening of the jaws is effected by downward movement of the push rod 34 by means of an actuator rod 36 which is slidably mounted in the tubular shaft 24. This actuator rod 36 is moved downwardly at regular intervals by a rocker arm 37 which is operated by a continuously rotating cam 38 (Fig. 1). This cam receives its power from the motor M through the aforementioned speed reduction gearing 30, sprocket chains 39 and 40 and sprockets 41 and 42, together with a sprocket 43 which is mounted upon a shaft 44. This shaft 44 also carries the cam 38.

The cup 19 which supports the tumbler T during the latter stages of the severing operation and after completion of the severing operation, is mounted upon a carrier plate 45 which is adjustably suspended from the bracket 17 by a rod 46. Adjustment of the carrier plate 45 is essential where the apparatus is employed in the production of glass articles of different heights. The cup is connected to a tubular shaft 47 which extends downwardly through the carrier plate 45 and between the plate and cup is connected to a spur gear 48. This gear has driving connection through a gear 49 and pinion 50 to a drive shaft 51, the latter having one end journaled in the carrier plate 45 and its other, or upper, end journaled in a bearing 52 at the outer end of the bracket 23. A bevel gear 53 is pinned to the upper end of the shaft 51 and runs in mesh with a bevel gear 54, the latter being mounted upon a horizontal shaft 55. This shaft 55 carries at its other end a bevel gear 56 which at times meshes with the bevel gear 26 through which rotary motion is imparted to the chuck 18. A sprocket 57

which is mounted upon the shaft 55 between the bevel gears 54 and 56, is driven by a sprocket 58 through a sprocket chain 59, the latter sprocket being mounted upon a countershaft 60.

The speed and direction of rotation of the cup 19 relative to the chuck 18, is determined by the ratio and/or number of gears which are mounted upon the carrier plate 45. In Fig. 7 the drive is such that the cup and chuck rotate in the same direction and at the same R. P. M., while in Fig. 8 an extra gear has been injected into the train for the purpose of reversing the direction of rotation of the cup with respect to the chuck. In Fig. 9 the gear ratio is such that the cup will be driven in the same direction as, but at a higher rate of speed than, the chuck. As has been pointed out heretofore, relative rotation between the tumbler and moile is of great importance.

Upward movement of the cup 19 immediately following complete severance of the moile from the tumbler, to again bring the upper edge of the tumbler into the flame projected by the burner 15, is obtained by means including a collar 61 and arm 62, both of which are suitably attached to the lower end of the tubular shaft 47, said arm being pinned to the lower end of a rod 63 which in turn is yieldingly and adjustably connected to the bell crank lever 28 which imparts vertical motion to the chuck. A sleeve 64 which surrounds a portion of the tubular shaft 47 and projects downwardly from the carrier plate 45, functions to limit upward movement of the arm 62 and therefore the cup 19. A coil spring 65 encircling the sleeve 64, operates if necessary, to return the cup to its lowermost position at regular intervals.

Elevation of the tumbler T with respect to the cup 19 so that it may be removed from the apparatus, is effected by a push-up device including a rod 66 which extends through the tubular shaft 47 and bottom of the cup and internally of the cup is connected to a disk 67. A rotary cam 68 moves the push rod 66 upwardly at regular time intervals. This cam is mounted upon a shaft 69 which receives its power from the motor M through the aforementioned shaft 33 and a series of sprocket chains 70 and sprockets 71 as is obvious by reference to Fig. 1.

The moile 12 is removed from the apparatus by means of a moile pan 73 or plate, which is mechanically positioned beneath the moile just prior to opening of the chuck jaws 20 when the latter are in their uppermost position. This moile pan is mounted upon the lower end of a vertical rock shaft 74 which in turn is journaled in a bearing 75 and at its upper end is connected through a rock arm 76 and link 77 to a continuously rotating cam 78. This cam is mounted upon the upper end of a shaft 79, which at its lower end, carries a bevel gear 80 running in mesh with a bevel gear 81, the latter being mounted upon the aforementioned shaft 33.

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

I claim:

1. The method of severing a moile from an article of glassware and finishing the article, which consists in rotating both the moile and article about their common longitudinal axis while in a normal upright position, applying a severing flame to the glass at the juncture of the moile and article, effecting rotation of the article relative to the moile approximately at the time severance is completed and for a period of time thereafter, and continuing application of the

flame to the upper edge of the article for a period of time following the severing operation.

2. The method which consists in severing a moile from a glass article by the application of an intensely hot flame to the glass at the point of severance, rotating the article and moile about their common longitudinal axis as a unit during practically the entire severing operation and while in a normal upright position, rotating the article in the same direction as, but at a higher rate of speed than the moile substantially coincidental with the completion of the severing operation, and continuing the application of the flame to the severed region of the article for a period of time after severance.

3. The method which consists in severing a moile from a glass article by the application of an intensely hot flame to the glass at the point of severance, rotating the article and moile about their common longitudinal axis as a unit during practically the entire severing operation, and rotating the article and moile in opposite directions substantially coincidental with the completion of the severing operation.

4. In apparatus for severing a moile from an article of glassware and finishing the article, the combination of a chuck adapted to grip the moile and suspend both the moile and article in an upright position, a burner positioned to apply a flame to the glass at the point of juncture of the moile and article, a cup positioned below the burner in axial alignment therewith to receive and support the article when severed from the moile, means for effecting relative rotation between the chuck and cup about their common vertical axis substantially coincident with severance of the moile and article, mechanism for ejecting an article from the cup, and means operable in advance of ejecting the article for elevating the cup sufficiently to subject the upper edge of the article supported thereby to the influence of the burner.

5. In apparatus for severing a moile from an article of glassware and finishing the article, the combination of a chuck adapted to grip the moile and suspend both the moile and article in an upright position, a burner positioned to apply a flame to the glass at the point of juncture of the moile and article, a cup positioned below the burner in axial alignment therewith to receive and support the article only when severed from the moile, means for rotating the chuck and cup about their common vertical axis, mechanism for ejecting an article from the cup, and means operable in advance of ejecting the article for elevating the cup sufficiently to subject the upper edge of the article supported thereby to the influence of the burner.

6. In apparatus for severing a moile from an article of glassware and finishing the article, the combination of a chuck adapted to grip the

moile and suspend both the moile and article in an upright position, a burner positioned to apply a flame to the glass at the point of juncture of the moile and article, a cup positioned below the burner and in axial alignment therewith to receive and support the article when severed from the moile, means for effecting relative rotation between the chuck and cup about their common vertical longitudinal axis, mechanism for ejecting an article from the cup, means for elevating the chuck and moile and releasing the moile therefrom at a point above the burner, and a moile plate operable to receive the released moile and transfer it to a position remote from the chuck.

7. In apparatus for severing a moile from an article of glassware and finishing the article, the combination of a chuck adapted to grip the moile and suspend both the moile and article in an upright position, a burner positioned to apply a flame to the glass at the point of juncture of the moile and article, a cup positioned below the burner and in axial alignment therewith to receive and support the article when severed from the moile, means for effecting relative rotation between the chuck and cup about their common vertical longitudinal axis, mechanism for ejecting an article from the cup, means for elevating the chuck and moile and releasing the moile therefrom at a point above the burner, a moile plate operable to receive the released moile and transfer it to a position remote from the chuck, and means for elevating the article and subjecting the upper edge thereof to the flame during the interval between complete severance of the moile from the article and ejection of the latter.

8. In apparatus for severing a moile from an article of glassware and finishing the article, the combination of a chuck adapted to grip the moile and suspend both the moile and article in an upright position, a burner positioned to apply a flame to the glass at the point of juncture of the moile and article, a cup positioned below the burner and in axial alignment therewith to receive and support the article only when severed from the moile, means for effecting relative rotation between the chuck and cup about their common vertical longitudinal axis substantially coincident with severance of the moile and article, mechanism for ejecting an article from the cup, means for elevating the chuck and moile and releasing the moile therefrom at a point above the burner, a moile plate operable to receive the released moile and transfer it to a position remote from the chuck, and means operable in advance of ejecting the article for elevating the cup sufficiently to subject the upper edge of the article supported thereby to the influence of the burner.

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