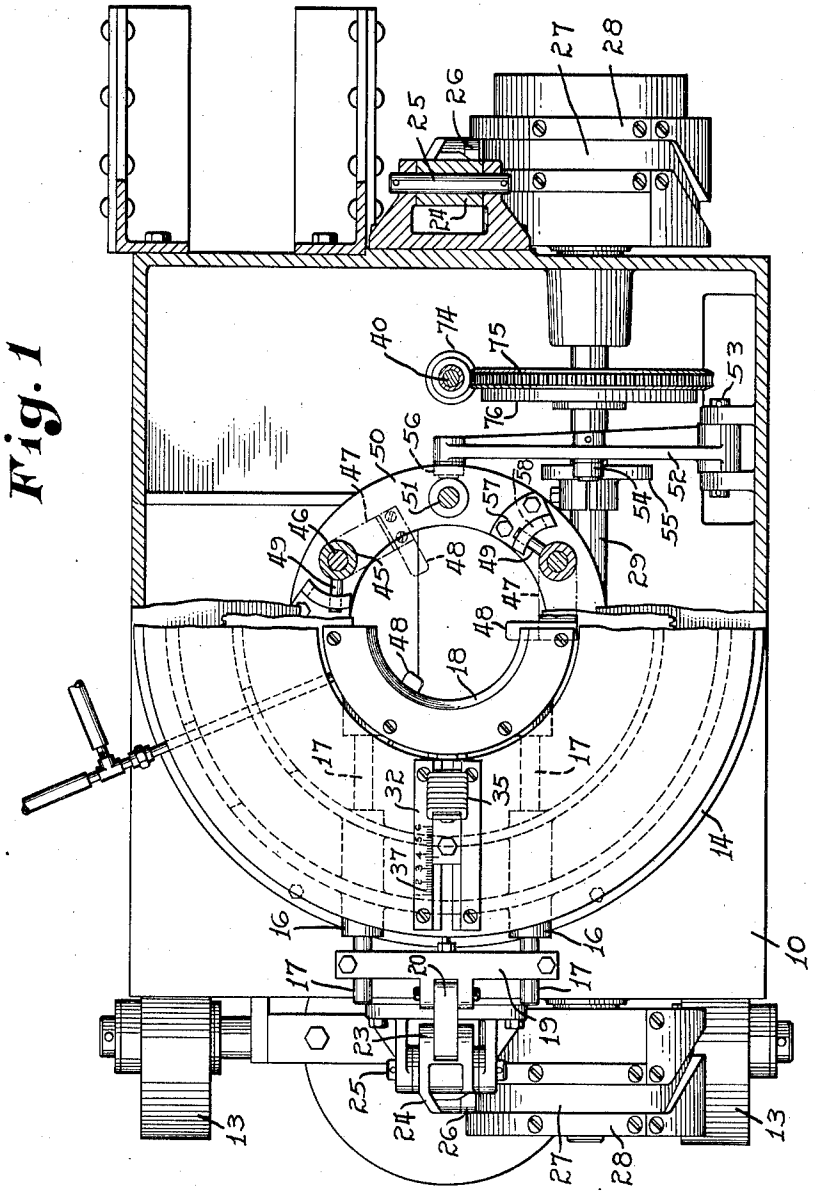
Dec. 5, 1933. T. H. SLOAN 1,937,723

APPARATUS FOR AND METHOD OF BURNING-OFF GLASSWARE

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Fig. 1



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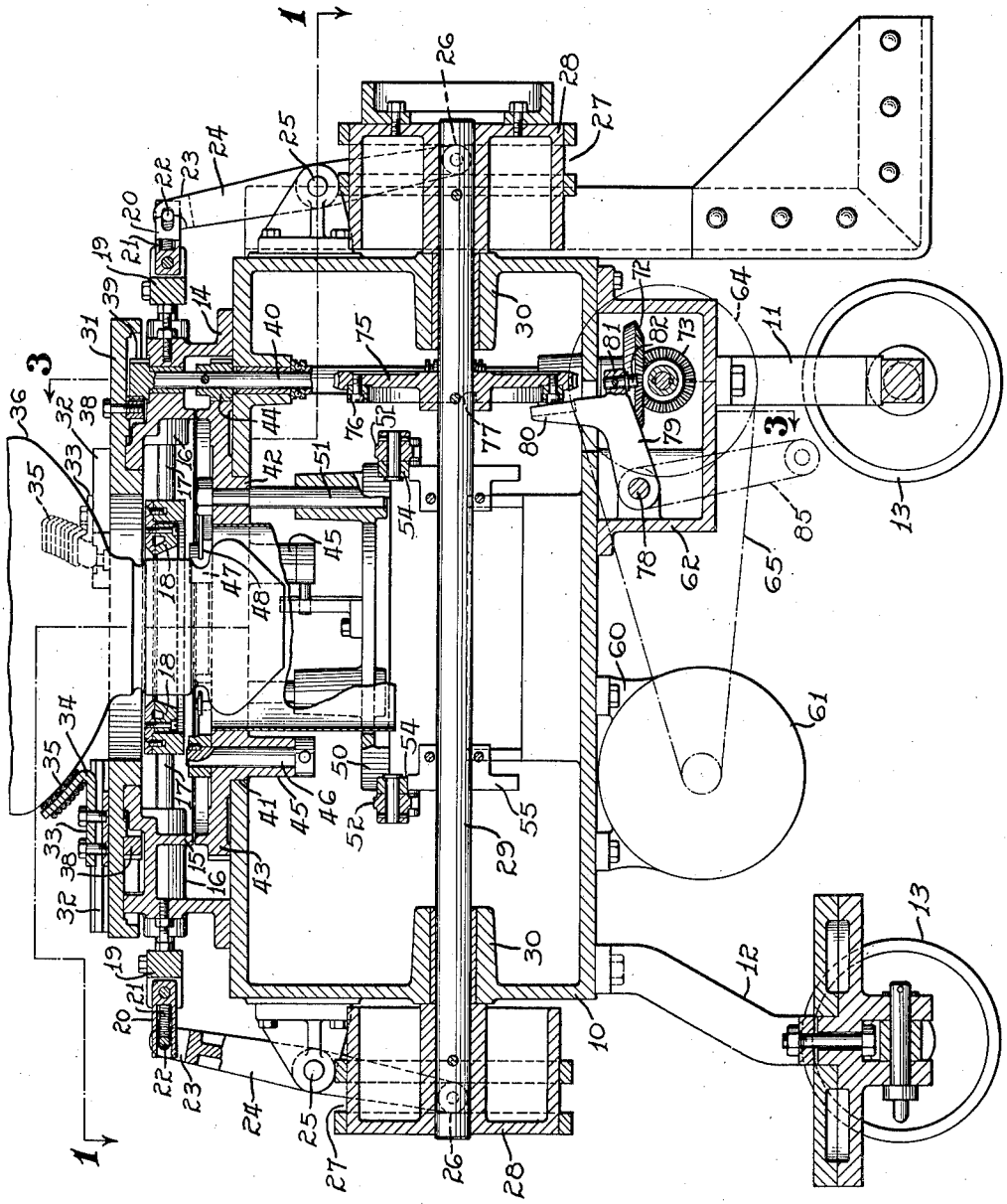


Fig. 2

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APPARATUS FOR AND METHOD OF BURNING-OFF GLASSWARE

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Fig. 3

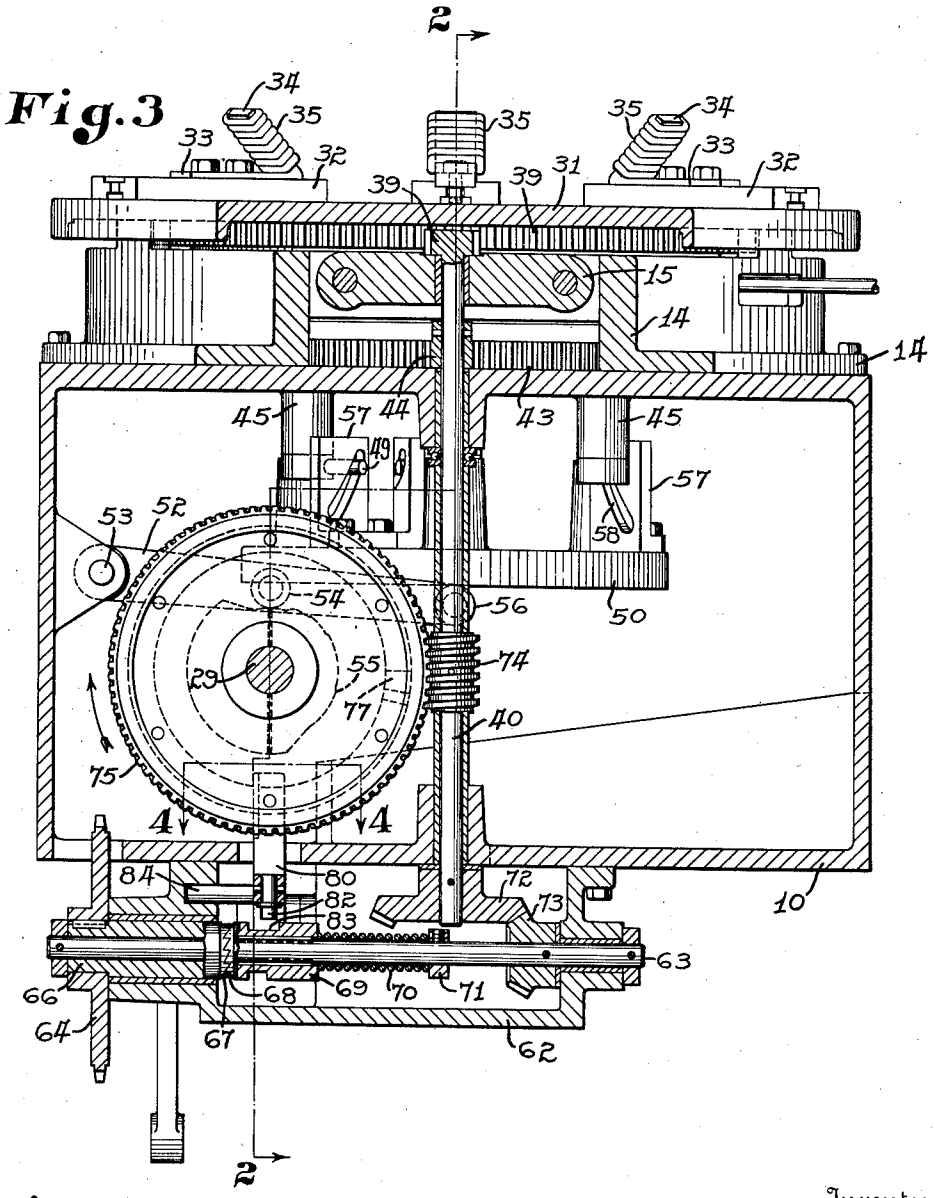
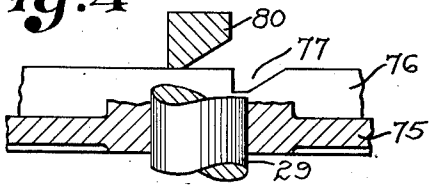


Fig. 4



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APPARATUS FOR AND METHOD OF BURNING-OFF GLASSWARE

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Fig. 5

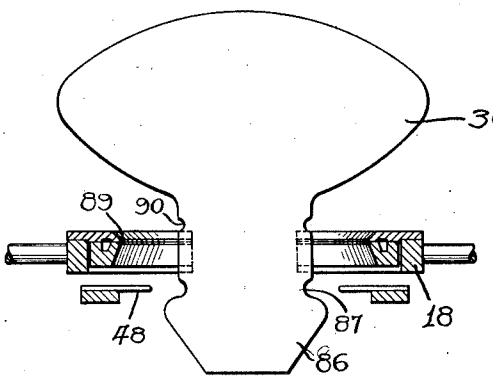


Fig. 6

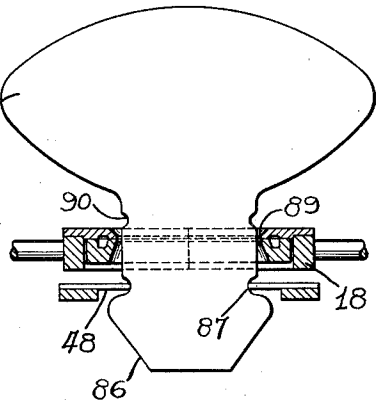


Fig. 7

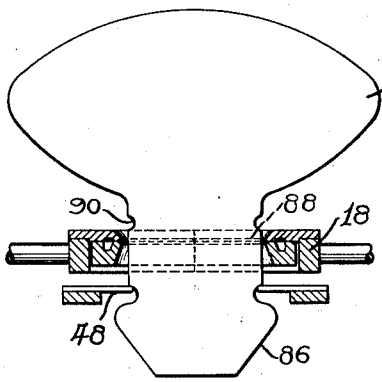
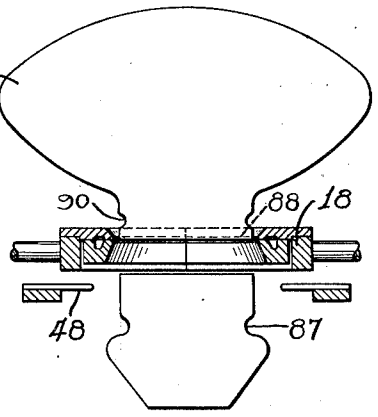


Fig. 8



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UNITED STATES PATENT OFFICE

1,937,723

APPARATUS FOR AND METHOD OF BURNING-OFF GLASSWARE

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Application March 12, 1929. Serial No. 346,349

8 Claims. (Cl. 49—50)

This invention relates to an apparatus for and method of burning off glassware, the object being to provide a method and means whereby glassware may be accurately positioned with respect to a burner and melted off cleanly along a definitely predetermined line.

The nature of the invention and the details and objects thereof will appear more fully as the description proceeds.

In the accompanying drawings forming a part of this specification, Fig. 1 is a partial plan view and a partial section, approximately on the line 1—1 of Fig. 2, of apparatus embodying one form of the invention: Fig. 2 a longitudinal vertical section of the same apparatus, substantially on line 2—2 of Fig. 3; Fig. 3 a section substantially on line 3—3 of Fig. 2; Fig. 4 an enlarged detail substantially on line 4—4 of Fig. 3; and Figs. 5 to 8 illustrate somewhat diagrammatically successive steps in the burning-off operation.

The working parts of the apparatus are shown mounted on a main frame 10 and on brackets, such as 11 and 12, which support the frame from wheels 13, and render the apparatus readily portable.

Mounted on the upper side of the main frame is a ring 14 provided with a flange 15 and with a pair of guide sleeves 16, in which sleeves slide rods 17 carrying at their inner or adjacent ends a pair of semi-annular burners 18, and at their outer ends being attached to cross heads 19. To each cross head 19 there is pivoted a sleeve 20 having therein a spring 21 which presses outward against a crosspin 22 passing through a slot in the sleeve and mounted in the forked upper end 23 of a lever 24. This lever is fulcrumed on the frame at 25, and carries at its lower end a roller 26 working in a groove 27 in a cam 28 mounted upon a shaft 29 journalled at 30 in the main frame.

Mounted rotatably on the upper sides of ring 14, 15 there is a annulus 31 having radial slideways 32 in its upper face, in each of which slideways there is adjustably mounted a bracket 33 having a supporting end 34 padded with asbestos 35 or the like, and shaped to support and center the body of a glass article, illustrated as a shade or globe 36. For convenience, indicating marks 37 may be provided on each slideway 32 to assist in positioning brackets 33 symmetrically about the axis of the annulus. A ring gear 38 is attached to the underside of annulus 31 and meshes with a gear 39 on vertical shaft 40 journalled in the frame and in bracket 14.

Within an opening 41 in the upper side of frame 10 there is mounted an annulus 42 having an outwardly extending flange 43 resting on the frame between brackets 14 and 15 and coaxial with annulus 31. Flange 43 is provided with teeth meshing with a gear 44 on shaft 40, so that the two annuli rotate at the same speed. Annulus 42 is provided with journals 45 for vertical rock shafts 46, each of which has mounted on its upper end an arm 47 carrying a positioning finger 48, and at its lower end is provided with an actuating pin 49.

A cam carrier 50 is mounted for vertical sliding movement on rods 51 depending from annulus 42, and levers 52 suitably fulcrumed at 53 on the frame, carry rollers 54 riding on cams 55 on shaft 29, the ends of the levers being supplied with rollers 56 on which cam carrier 50 is supported. For each rock shaft 46 there is a cam 57 on carrier 50, provided with a slot 58 which receives pin 49. By this means positioning fingers 48 are controlled by cams 55 on shaft 29.

Beneath casing 10 there are attached the feet 60 of a motor 61, and a bracket 62 mounted on the underside of the casing has journalled therein a shaft 63 on one end of which there is mounted a sprocket wheel 64 driven from the motor by a chain 65, sprocket wheel 64 being keyed to a sleeve 66 (Fig. 3) running loosely on shaft 63. The inner end of sleeve 66 carries clutch teeth 67 adapted to engage clutch teeth 68 on a sleeve 69 normally pressed towards sleeve 66 by a spring 70 mounted on shaft 63 and held compressed by a collar 71 adjustable upon the shaft.

On the lower end of shaft 40 there is a gear 72 which meshes with a gear 73 on shaft 63, shaft 40 carrying a worm 74 which meshes with a worm wheel 75 on shaft 29. This worm wheel has attached to one of its sides a ring 76 (Fig. 2) provided with a notch 77. A rock shaft 78 is mounted in bracket 62 and carries an arm 79 having an upwardly directed member 80 adapted to ride against ring 76 and to fall into notch 77 when the notch comes in registry with it. Arm 79 also carries a lug 81 in which there is mounted a pin 82, the arrangement being such that while member 80 rests against ring 76, pin 82 is held just above sleeve 69. When notch 77 (Fig. 4) comes in registry with member 80, it allows pin 82 to fall and ride on sleeve 69 until spiral groove 83 comes beneath the pin, whereupon the pin falls into the groove, and, as sleeve 69 continues to turn, the pin presses against the edge of the groove and crowds the sleeve 69 away from sleeve 66 to open the clutch. To pre-

vent pressure of sleeve 69 against pin 82 from cramping member 80 upon its axis, an abutment pin 84 may be provided against which the face of member 80 may slide. Rock shaft 78 may be provided with an arm 85 actuated in any desired way by the operator to close the clutch at any desired time.

The main features of the operation of the apparatus will be apparent from the foregoing description, but for convenience, the operation of the apparatus may be summarized in connection with the following description of the melting off of a glass article by this apparatus.

The notch in ring 76 is so positioned that the apparatus is stopped with the two halves of the burner separated, and fingers 48 spread apart as indicated in Fig. 5. While the apparatus is in this position, an article such as a globe 36 is placed upon the supports so that it rests upon asbestos windings 35. The particular article illustrated has an enlarged ring 86 somewhat larger in diameter than its neck, and therefore the two halves of the burner need to be spread apart while this ring is being inserted through the burner. Just above the ring there is provided a groove 87 in the moil of the article, above which groove is the neck to be cut off along line 88, as shown in Fig. 8. The article has a groove 90 just above the cut-off line, but this is merely an incidental feature of the finished article, and does not have any direct bearing upon the burning off operation.

After the article has been placed in position as described, the operator rocks shaft 78 to raise pin 82 out of groove 83, permitting spring 70 to close the clutch. As a result, shaft 40 immediately begins to turn supporting plate 31 and also member 42 about the axis of the article. At the same time shaft 29 begins to rotate, and its end cams act through the lower ends of the shaft rock levers 24 to close the burner so that its slit 89, from which a flame is projected, surrounds line 88 where the glass is to be cut off. In the meantime, and slightly in advance of the complete closure of the burner, cams 55 operate to bring fingers 48 into groove 87, as indicated in Fig. 6, which groove is formed for use in the burn off process, its first use being to provide for the accurate centering of the article in the burner. It will be readily understood that the article might rest upon asbestos windings 35 without having its axis coincide with the axis of the burner, but groove 87 in the article is symmetrically formed during the formation of the article, and, when fingers 48 center the neck of the article by entering groove 87, the axis of the article necessarily coincides with the axis about which fingers 48 and the support are rotating. This places the article in proper relation to the burner so that the glass will be substantially the same distance from the burner at all points around its circumference.

The burner is operated to produce a very thin sharp flame which quickly softens the glass. If the glass were very thin, the flame would complete the severance of the glass promptly, but the articles for which this apparatus is particularly provided have walls of appreciable thickness, and these walls become softened an appreciable time before being completely severed. Cams 55 are arranged to separate fingers 48 slightly, after the flame has been applied long enough to soften the glass. Thereupon, the weight of glass below the line of severance stretches the softened glass at the line of severance to a slight extent, the downward movement of the ring being both limited and guided by the contact of the upper wall of groove 87 with fingers 48. This slight stretching of the glass reduces its thickness at the line of severance so as to hasten the completion of the severance. Furthermore, this same decrease in the thickness of the glass at the line of severance, and the drawing down of the greater part of the softened glass below the line of severance, reduces the quantity of molten glass adhering to the severed edge of the article. If ring 86 were maintained in its original position until severance was complete, a greater amount of molten glass would be left on the severed edge 88, both because it would not be pulled down by this lowering movement, and also because a longer heating period would be required and more glass would be molten. For this reason the regulated lowering of ring 86 reduces the thickened bead on the severed edge to the desired amount.

After ring 86 has been lowered as described, and as shown in Fig. 7, the heating is continued until severance is completed, at which time cams 55 operate to swing fingers 48 back to the position in which they are shown in Fig. 8. The burners remain in position after the removal of the fingers and the dropping of the burned off glass for a sufficient length of time to satisfactorily finish the edge of the ware. After this, the continued turning of shaft 29 operates levers 24 to separate the burners, so that the burners and fingers are returned to the position in which they are shown in Fig. 5. When this is accomplished, shaft 29 will have made one complete turn, and notch 77 is again in registry with member 80 so that pin 82 drops into groove 83 and the clutch is opened and the apparatus stopped.

It will be seen from the foregoing disclosure that the apparatus quickly and accurately severs the necks from blown articles, the articles being automatically centered, and the stretch of the necks during severance being automatically controlled, as well as the duration of the application of the flame. This results in accurate, uniform and reliable severing of articles.

The method whereby a centering groove is provided in the waste portion of the blown article and utilized both for centering the article for burning off purposes and for limiting and regulating the stretch of the neck during severance, is an important feature in making possible the quick automatic centering and the uniform and accurate severance of the article. The groove not only aids the fingers in the original centering, but it maintains the article centered while the fingers are slightly separating and ring 86 is dropping, so that the ring drops equally at all points about its circumference, and in a directly vertical direction. If not thus centered and controlled, any slight difference in the thickness of the neck at different points or in the diameter, whereby it would be nearer to the burner at one point than another, would result in forming relatively weak places in the softened portion of the neck, and such weakened spots would stretch more rapidly than other portions, which would still further thin the initially weak portion and lead to severance of the neck at certain points materially ahead of other points, with a resultant irregularity of the severed edge.

While, as stated above, groove 90 has no direct connection with the burning off operation, it has

a relation thereto. The groove is for the purpose of forming the end of the article so that it can be readily clamped in a suitable holder by clamping means entering groove 90. When this is done, the article is supported by the glass between the groove and the severed edge. For this reason, it is desirable that the severed edge shall be fairly uniform.

While one form of apparatus has been described with some particularity, and one definite form of article is shown as being operated upon by the apparatus, it will be readily apparent that the method of operation might be applied to different forms of articles where a uniform edge is required, and that various changes may be made in the apparatus within the scope of the appended claims.

I claim as my invention:

1. The method of severing glassware having a form of rotation which comprises positioning such an article with its axis vertical, applying heat to the desired line of severance, which is maintained in fixed relation to said article during the severing operation, until the glass is softened along said line, allowing the glass below said line to drop a definitely limited distance while maintaining it centered, and supporting the glass in said slightly dropped position and continuing the heating of the glass at the line of severance until severance is completed.

2. A method which comprises blowing a glass article having a form of rotation and providing said article during blowing with a groove in its moil, positioning the blown article with its moil downward, centering the article by centering said groove, applying heat to the line of division between the article and its moil until the zone of said line is softened, allowing the stretching downward of this softened zone, limiting this stretching and at the same time maintaining the moil centered by means of the groove, continuing the heat to complete severance of the moil from the article, and releasing the moil.

3. In apparatus for burning off glassware, a burner, a support above the burner, centering fingers below the burner, means for rotating the support and the fingers about a vertical axis and means for moving the fingers towards said axis to center the waste glass to be cut off and then to move the fingers slightly apart to allow a limited descent of said waste glass, and finally farther apart to release the glass after it has been separated.

4. Apparatus for burning off glass, comprising a plurality of burners adapted to form a substantially annular burner with a flame directed towards a common vertical axis, means to move said burners towards and from said axis, a support for a glass article above said burner, centering fingers below said burner, and means to move said fingers towards and from said axis, said means for moving the burners and fingers operating in timed relation to close the fingers to centering position when the burners are moved together, shortly thereafter to separate the fingers slightly, and finally to separate the fingers sufficiently to release the severed glass.

5. In apparatus of the class described, two semi-annular burners, means for moving said burners horizontally together to form an annular burner and away from each other, a ring below said burner, fingers mounted in said ring, means to swing said fingers towards and from the axis of said burner and ring, a holder above said burner and means for rotating said holder and ring in unison.

6. In combination, a pair of semi-annular burners, a shaft, connections between the shaft and said burners to move them horizontally towards and from each other, a support above the burners, centering fingers beneath the burners, means connected with said shaft for rotating said support and fingers in unison, means connected with said shaft for moving said fingers toward and from the axis of rotation, and a one-rotation clutch manually operable to start the rotation of the shaft and automatically operable to stop the shaft after one rotation.

7. The method of severing glassware having a form of revolution which comprises placing an article in vertical position, applying heat to a desired line of severance, which is fixed relative to said article during the severing operation, to soften the glass along said line, permitting the glass below said line to drop by its own weight a definitely limited distance insufficient to part said glass, supporting the dropped portion in its lower position and continuing the heating of the glass at the line of severance while it is relieved of the strain of the weight of the lower portion and until severance of the glass is completed, whereby the article is of uniform thickness at its edge along the line of severance.

8. Apparatus for burning waste glass from glass articles, comprising a plurality of burners adapted to form a substantially annular burner with a flame directed towards a common vertical axis, means to move said burners from said axis to receive a glass article and then towards said axis to glass severing position, a support for a glass article above said burner, centering fingers below said burner, and means to move said fingers for the waste glass towards and from said axis for permitting in accordance with their position the partial drop of the waste glass during the burning off process or the complete removal of said waste glass when the latter is completely severed.

THEODORE H. SLOAN.