2 Sheets—Sheet 1.

A. H. HEISEY & J. E. MILLER.

Tool for the Manufacture of Glassware.

No. 240,022. **Patented April 12, 1881.**

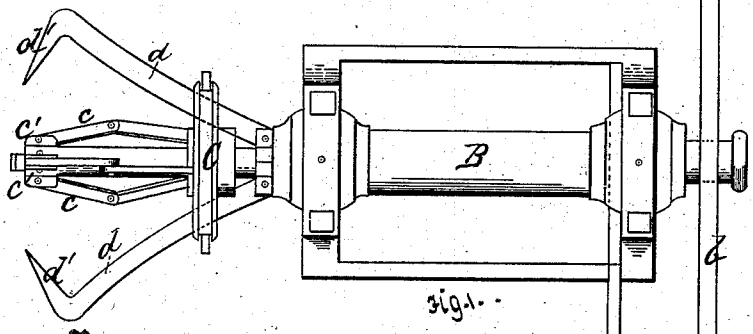


Fig. 1.

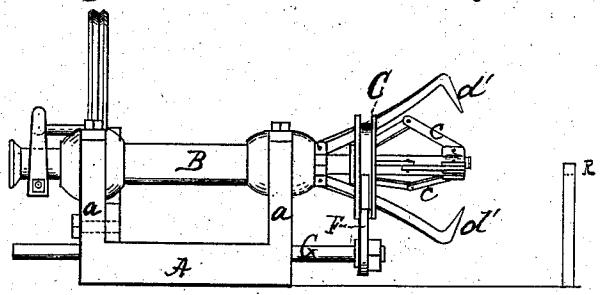
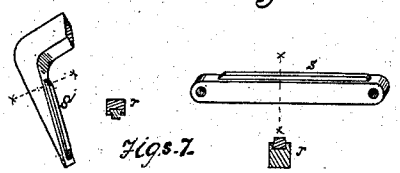


Fig. 2.



Figs. 7.

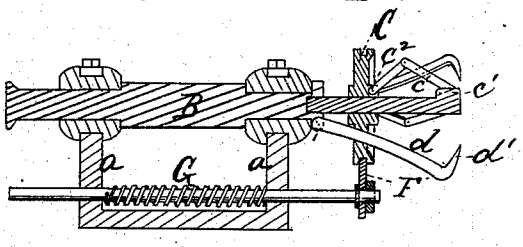


Fig. 3.

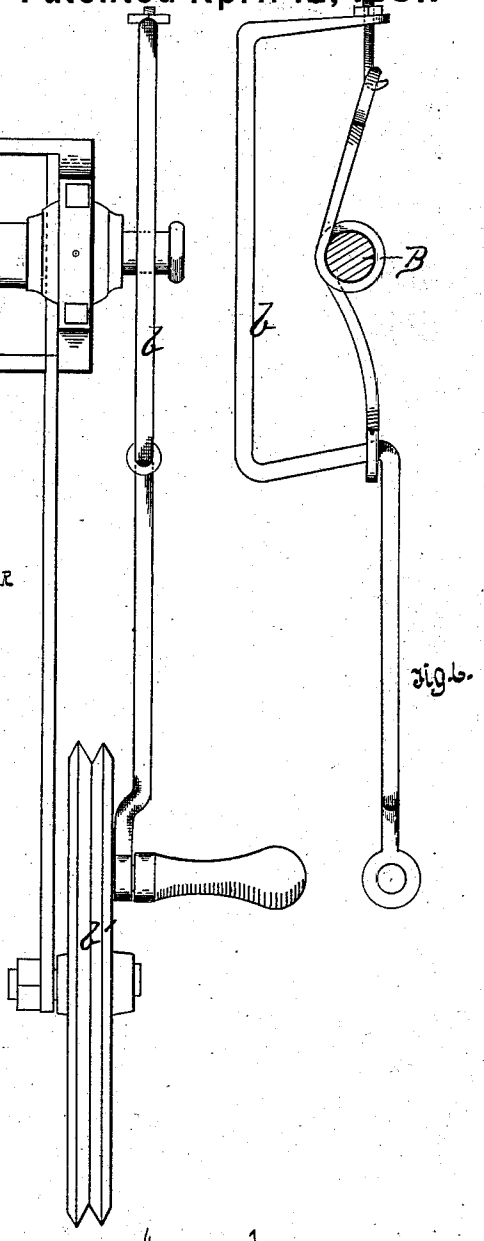


Fig. 6.

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2 Sheets—Sheet 2.

A. H. HEISEY & J. E. MILLER.

Tool for the Manufacture of Glassware.

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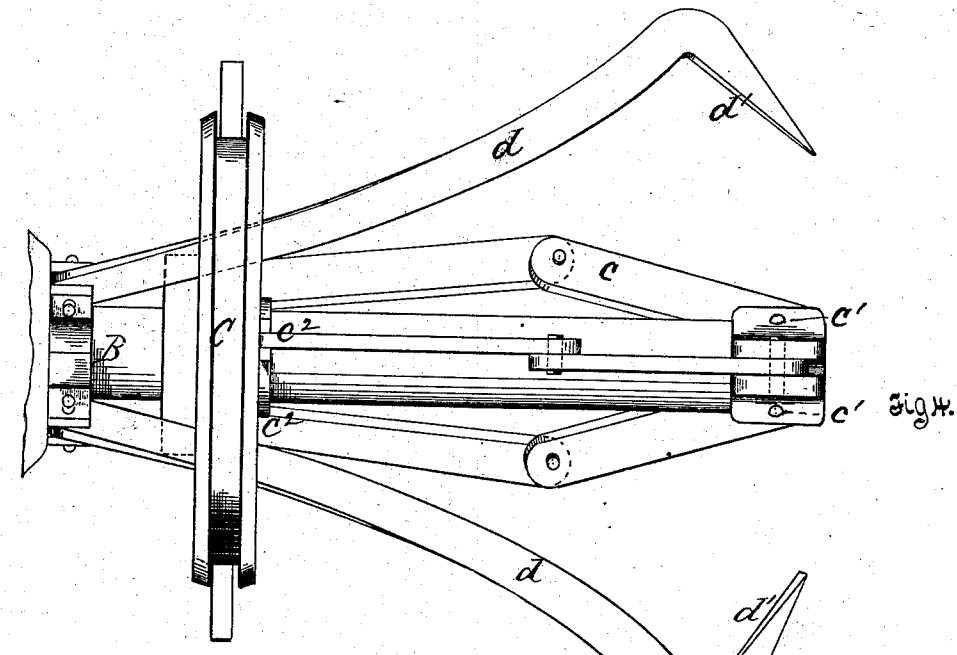


Fig. 4.

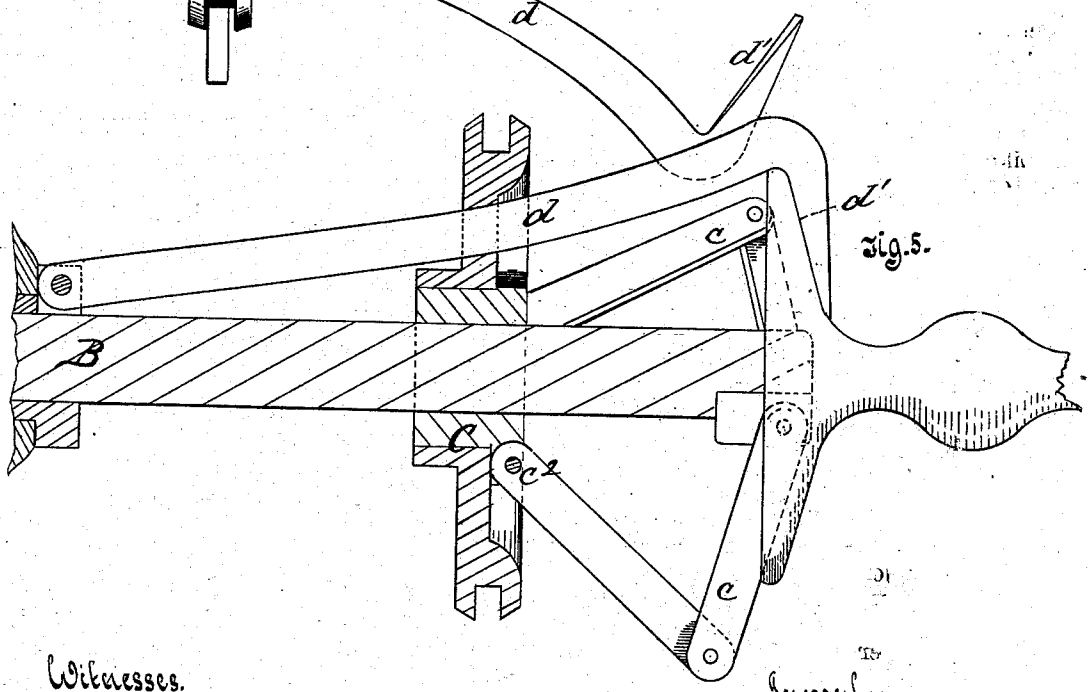


Fig. 5.

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UNITED STATES PATENT OFFICE.

AUGUSTUS H. HEISEY AND JOHN E. MILLER, OF PITTSBURG, PA.

TOOLS FOR THE MANUFACTURE OF GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 240,022, dated April 12, 1881.

Application filed April 18, 1879.

To all whom it may concern:

Be it known that we, AUGUSTUS H. HEISEY and JOHN E. MILLER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Tools for the Manufacture of Glassware; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of devices embodying our invention. Fig. 2 is a side elevation. Fig. 3 is a longitudinal central section. Figs. 4 and 5 are enlarged detail views, showing the operation of the devices; and Fig. 6 is an end view, showing the preferred means of rotating the devices. Fig. 7 is a cross-section of formers, showing the manner of attaching wood, soapstone, asbestus, or other working faces.

Like letters refer to like parts wherever they occur.

Our invention relates to the method and means employed for opening, shaping, transforming, and finishing either blown or pressed glassware.

We have chosen, for purposes of illustration, to show mechanism adapted to open a cup-footed article, but do not expect or intend to be limited to the manufacture of such an article.

We will now proceed to describe our invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A represents a suitable bed, on which are erected standards *a*, wherein the shaft B is journaled, and this shaft B is adapted to be reversely rotated by the bow *b*, which can be operated from a crank on pulley or wheel *b'*, power being applied to wheel *b'*, when desired. Other well-known mechanism or gearing may be substituted for the bow to obtain the alternately reverse rotation of the shaft, if preferred.

On the projecting end of shaft B, or a spindle thereon, are pivoted the toggle-arms *c*, as at *c'*, the opposite ends of said arms being pivoted, as at c^2, to a slide, C, movable longitudinally on the spindle, so that accordingly as the slide C advances or recedes the arms expand, or, in other words, the angle at which the arms stand to the axis of the shaft will increase or decrease, and by properly proportioning and shaping the sections of the toggle-arms they may be caused to move through nearly one hundred and eighty degrees, so as to almost invert an article, if desired. For the greater number of articles to be transformed or shaped a construction which will permit the arms to open out until they stand at right angles, or nearly so, to the axis of the shaft will suffice.

Pivoted or hinged at one end to the shaft B or spindle, back of the slide C, are curved arms *d*, which terminate in formers *d'*, set in planes intersecting the axis of the spindle. These arms *d* pass through slots in the slide C, so that the same motion of said slide that projects the toggle-arms *c* serves to close the pivoted arms *d*, and finally bring the forming-surfaces into a position substantially at right angles to the axis of rotation. The slide C is operated by a fork, F, attached to the spring-rod G, which can be moved through a suitable pedal, (not shown,) or any equivalent and well-known way of operating the slide may be substituted therefor, at the will of the constructer. In conjunction with such devices we employ a rest, R, arranged in axial line with the shaft B.

We have also found that where any dirt or dust from the warming-in furnace or glory-hole adheres to the article being transformed, the tools or formers *c* and *d*, if of metal, will leave the surfaces scratched or marred. We therefore form in each tool or former a dovetailed or equivalent recess, *r*, Fig. 7, and wedge therein wood, soapstone, asbestus, or equivalent substance, *s*, which will give to the formers working-surfaces which will not injure the glass.

The above constitute the devices as adapted to open a cup-footed article, and they will operate as follows: Power being applied to rotate the shaft B in alternately reverse direction, the snap holding the cup-footed article is placed in the centering-rest R and the cup is pushed over the first sections of the toggle-arms. The slide C being operated, carry said sections out to a right angle with the axis of rotation, thus opening out the cup to a flat surface. The same action of the slide gradually draws the arms *d* in, so as to bring the formers *d'* to the center in ra-

dial lines parallel to the first sections of the toggle-arms, so that by the time the cup is fairly opened out it is brought between two formers, which true and flatten it, giving a more accurate and uniform result than can be obtained by even skilled hand-labor. As soon as the article is properly formed the foot can be removed from the pedal, and the forked spring-rod will retract the slide C, causing the arms *d d'* to open and the toggle-arms *c* to close toward or against the spindle, freeing the article formed and setting the machine to repeat the former operation.

We shall now proceed to specify some more extended uses to which certain combinations of the elements shown can be applied, either in their existing state or by modification, within the province of the skilled mechanic.

First. The angles at which the extremities *d'* of the arms *d* stand to the shaft and the angles at which the outer sections of the toggle-arms become fixed in their outward movement can be limited so as to produce flaring bowls thereon; and, if desired, the arms *d d'* can be omitted when the device is employed for flaring alone.

Secondly. In opening up and shaping hollow ware, such as chimneys, globes, fish-globes, &c., the toggle-arms *c* may be shaped so as to take a true curved form or convexity when expanded, and the arms or tools *d d'* may also be curved, so that when brought up to their final position they will present a similar concavity; or, in some cases, the outer tools or arms, *d d'*, may be entirely omitted. Then the whole of the former will be inserted into the hollow article to be transformed.

Though we have used the plural in this specification wherever we have described the devices *c* and *d'*, and have shown three sets thereof, we wish it clearly understood that wherever the two are used in combination, either as shown or modified, as indicated herein, a single set is sufficient and efficient, and involves the principle of construction, though two or more are preferably employed, and the same is repeated of either of the devices *c* or *d'*, when used separately as an expanding former working on the toggle principle or an exterior former applied by a positive and progressive movement toward the center of rotation.

We will also add that where the invention herein contained is applied to the opening and shaping of cup-footed articles we employ the alternately reverse rotation, as before specified; but where the devices are employed as indicated in the modifications the rotation of the shaft B may be continuous in one direction or may be reversed at the will of the operator or constructer of the machine.

Having thus described the nature, object, and advantages of our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a machine for shaping hollow-ended glassware, the combination of a former or formers adapted to open or swing out from a center on a changing radial line or lines, and a former or formers adapted to advance to the center in a plane substantially parallel to the radial line or lines of the expanding former, substantially as and for the purpose specified.

2. In a machine for opening and forming hollow-ended glassware, the combination of a toggle-arm pivoted to a rotating spindle and operated by a slide thereon, and a curved former pivoted on the spindle and operated by the same slide that operates the toggle-arm, substantially as and for the purpose specified.

In testimony whereof we, the said AUGUSTUS H. HEISEY and JOHN E. MILLER, have hereunto set our hands.

AUGUSTUS H. HEISEY.
JOHN E. MILLER.

Witnesses:
F. W. RITTER, Jr.,
T. B. KERR.