

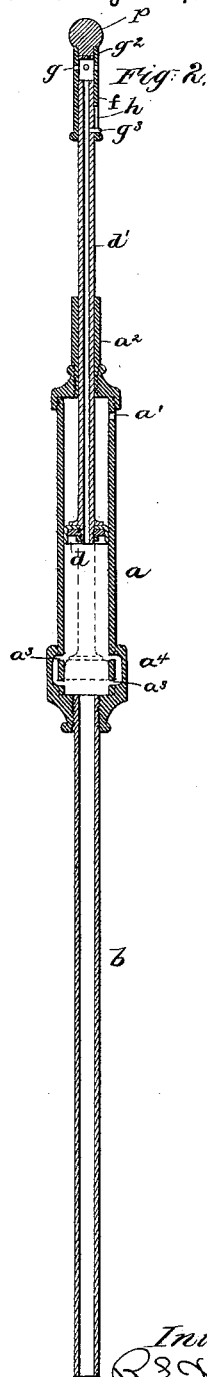
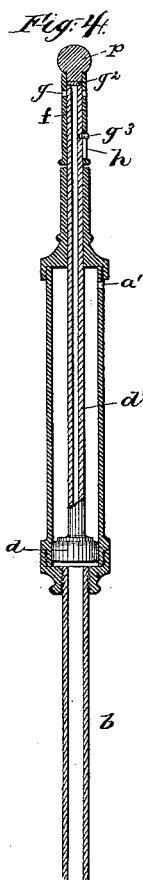
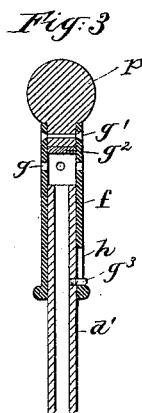
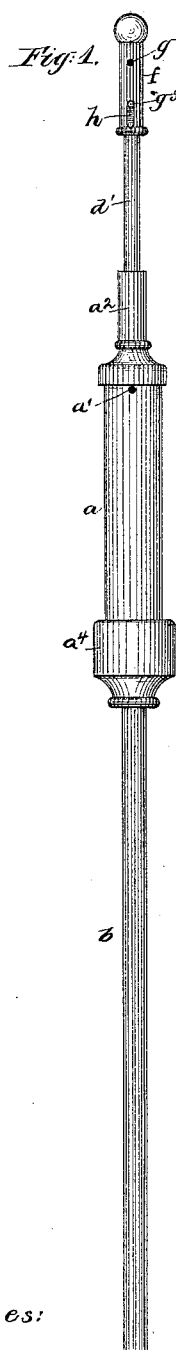
(No Model.)

R. E. DONOVAN, F. HAZLETT & J. JOHNSTON.

APPARATUS FOR BLOWING GLASS.

No. 386,302.

Patented July 17, 1888.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR BLOWING GLASS.

SPECIFICATION forming part of Letters Patent No. 386,302, dated July 17, 1888.

Application filed July 9, 1887. Serial No. 243,830. (No model.) Patented in England March 3, 1887, No. 3,258.

*To all whom it may concern:*

Be it known that we, RICHARD EDWARD DONOVAN, FRANCIS HAZLETT, and JAMES JOHNSTON, all of Dublin, Ireland, citizens of the United Kingdom of Great Britain and Ireland, have invented a certain new and useful Improvement in Apparatus for Blowing Glass; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to apparatus whereby the necessity of blowing from the mouth is dispensed with. By its aid the manufacture of bottles and hollow articles generally may be carried on with great expedition and convenience and economy.

The accompanying drawings form a part of this specification, and represent what we consider the best means of carrying out the invention.

Figure 1 is an elevation, and Fig. 2 a longitudinal central section, of our improved glass-blowing apparatus. Fig. 3 is an enlarged view of the upper end of piston-rod and air-cap. Fig. 4 shows a modification.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A hollow cylindrical chamber, *a*, is attached to the pipe *b*. The upper portion of this cylinder is perforated, as indicated by *a'*. From the center of the top extends a neck, *a''*, in which slides the hollow rod *d'*, carrying the piston *d*. There may be a flow of air through the piston-rod in either direction when not prevented by other means. On the upper or external end of the piston-rod *d'* a tight-fitting cap, *f*, is free to slide vertically to an extent limited by the stud or pin *g''* received in the longitudinal slot *h* in the side of the cap. The top of the cap is provided with a wooden knob, *p*, secured by a pin, *g'*, and underneath is a disk of india-rubber, leather, or analogous material, *g''*. In its upper portion are holes *g*, which allow the free passage of air inward and outward when the cap is raised, but are closed by the upper end of the piston-rod *d'* when the cap is depressed.

The action of the apparatus is as follows:

The piston being raised in the cylinder *a*, the operator inserts the lower end of the pipe *b* in the same manner as the ordinary blow-pipe in the molten glass and takes up a proper quantity and inserts in the mold. Then, instead of blowing with his mouth, he presses down the tubular cap *f*, thus closing the openings in the upper end of the rod *d'* and slightly compressing the flexible material *g''*, and, the pressure downward being continued, the piston descends and drives the air into the glass bulb at the end of the pipe. At the moment of completing the necessary pressure to mold the glass vessel the operator removes his hand from the knob, whereupon the compressed air, having its tension increased by the heat of the molten material and the flexible material *g''* by its compressed power, lifts the tubular cap and escapes through the holes *g*. By the same holes, when the vessel is cooling, air is admitted to the interior, and the possibility of a partial vacuum is prevented. In this operation the operator must avoid depressing the piston to the fullest extent, except at the close of the operation. On the other hand, should the operator be engaged in blowing a glass demijohn or other article requiring a greater quantity of air to complete the operation than is afforded by one stroke of the piston, he can recharge the apparatus by raising the cap, which being followed by the rod or plunger, the air rushes into the chamber through the holes in the cap, after which the downward stroke is repeated, as before. The apertures *a'* in the upper part of the chamber *a* allow the air to enter and escape freely above the piston, according to the motion. For molding articles requiring but one motion of the piston the releasing of the cap *f* may be omitted.

Around the base of the chamber *a* an annular recess is formed in the collar *a'*, which communicates with the interior of the chamber by means of two rows of holes, *a''*, spaced vertically a little more than the depth of the piston-packing, so that when the piston is moved to its extreme lowest position it passes the upper row of holes, as shown by dotted lines, and allows the compressed air to escape from front to rear of same. In this position of the piston air is also free to pass in the reverse direction to supply the contraction of the air in the

5 glass vessel when it cools. Thus by either of these means the escape of compressed or expanded air at the moment of completing the article under formation is provided for, and also the equalization of pressure on the inside  
10 and outside of the glass bottle when cooling, after its removal from the mold.

Having now particularly described and ascertained the nature of our said invention, we would have it understood that modifications  
15 may be made in the details without departing from the principle or sacrificing the advantages of the invention. For molding articles of a certain size the cap *f* may be kept closed, which will virtually make the piston and rod  
20 solid; or even the piston-rod and piston may themselves be made solid and the channels *a'* relied on to liberate the air at each operation.

Fig. 4 shows the passages *a'* omitted. With this form of the apparatus the cap *f* should be  
25 raised at each operation.

We claim as our invention—

1. In apparatus for blowing glass, the combination of the chamber *a*, the pipe *b*, the piston *d*, and the piston-rod *d'*, said chamber *a*  
30 being provided with the passage *a'* for allowing the free movement of air past the piston when it is fully depressed, as herein specified.

2. In apparatus for blowing glass, the combination of the chamber *a*, the pipe *b*, the hollow piston *d*, and the hollow piston-rod *d'*, with the tubular cap *f*, for providing for the ingress and egress of air at will in any position of the piston and for the repetition of the stroke of the piston, in the manner substantially as  
40 herein specified and set forth.

3. In an apparatus for blowing glass, the chamber *a*, provided with the passages *a'* at its lower end, and the pipe *b*, in combination with the hollow piston *d*, hollow piston-rod *d'*, the tubular cap *f*, having side perforations, *g*, and  
45 sliding upon the upper end of said piston-rod, whereby said perforations may be opened or closed, as and for the purpose specified.

4. The tubular piston-rod *d'* and lateral pin *g'*, in combination with the tubular cap *f*, said  
50 cap comprising a body having a longitudinal slot, *h*, engaging said pin, and also having lateral openings *g*, so located as to be opened and closed by the sliding motion of the cap permitted by said slot and pin, and a closed  
55 top, *p*, substantially as specified.

5. In an apparatus for blowing glass, the chamber *a*, tube *b*, hollow piston *d*, and hollow piston-rod *d'*, in combination with the tubular cap *f*, fitting and sliding upon the upper end  
50 of said tubular piston-rod and provided with lateral openings, as described, the elastic material *g'* within said cap above the end of the piston-rod, the closed top *p*, and transverse pin *g'* for securing it in place, as and for the  
65 purpose specified.

Dated this 11th day of June, 1887.

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