(No Model.) 2 Sheets—Sheet 1.

H. J. COLBURN & M. J. OWENS.

GLASS BLOWING MACHINE.

No. 594,343. Patented Nov. 23, 1897.

Fig. 1.

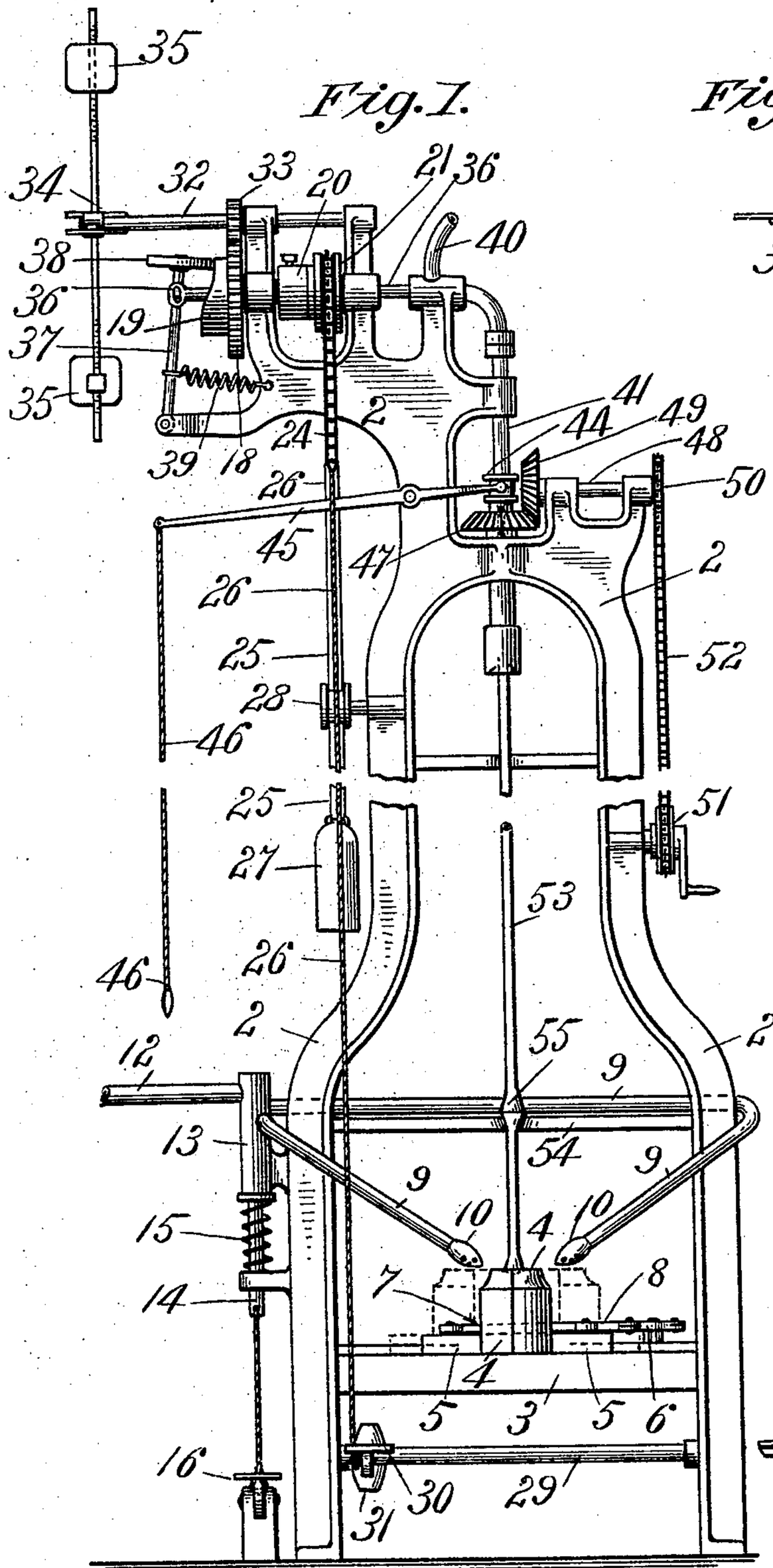
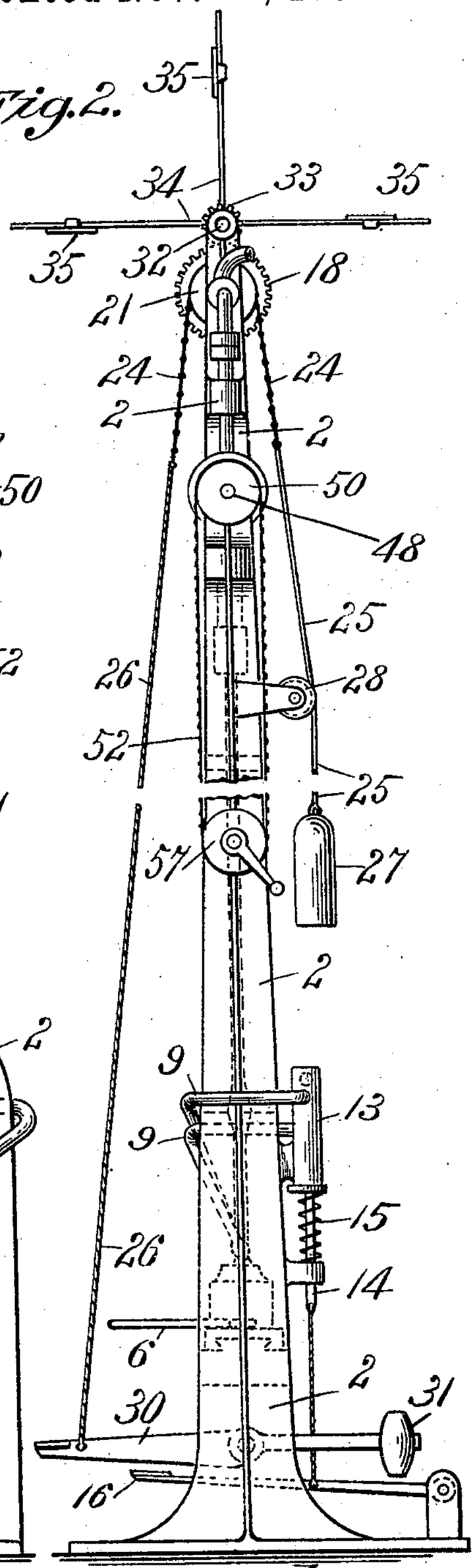


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

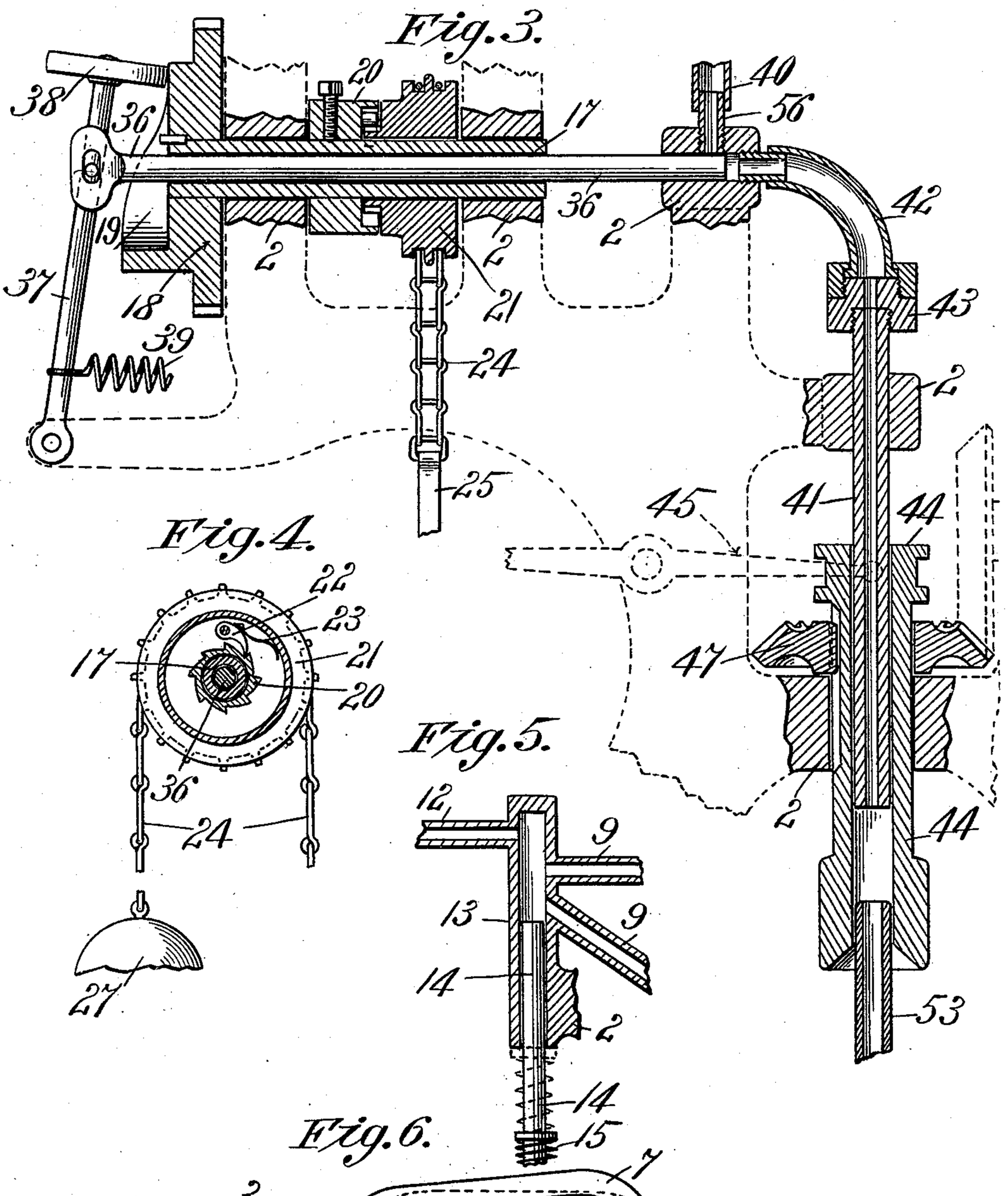
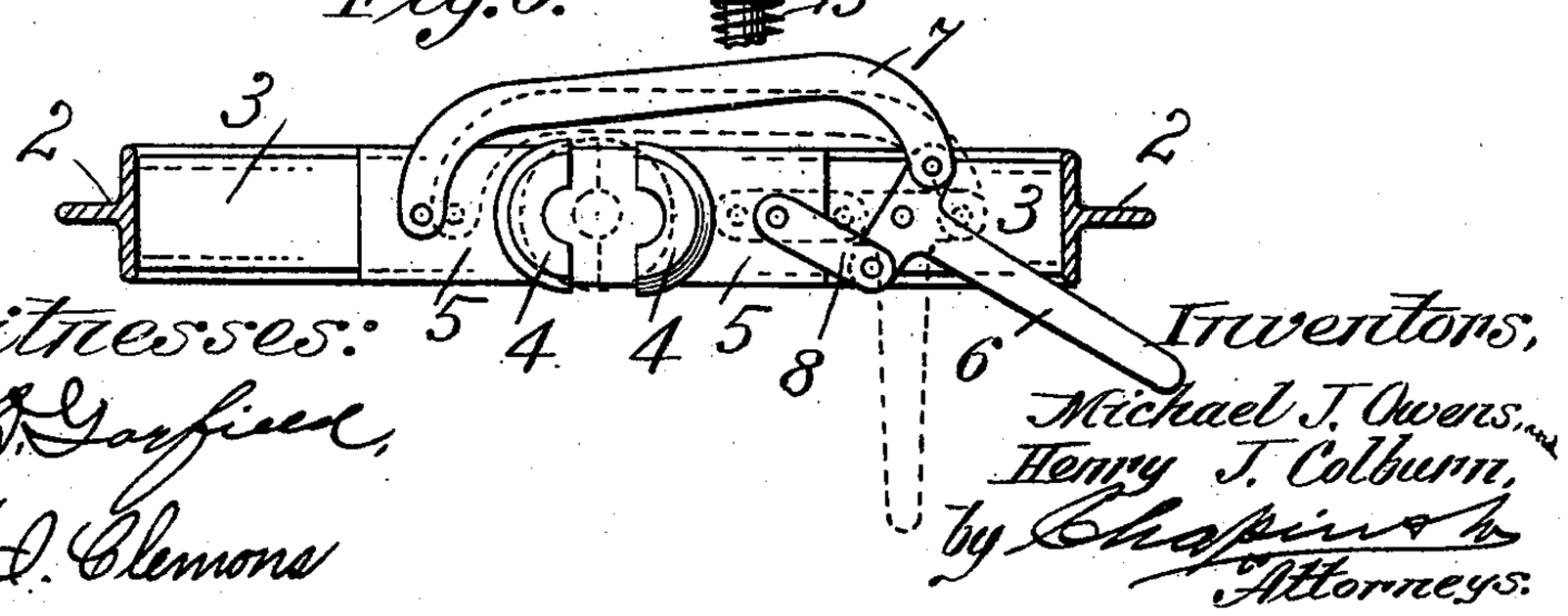


Fig. 4.

Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY JOSEPH COLBURN AND MICHAEL JOSEPH OWENS, OF TOLEDO, OHIO,
ASSIGNORS TO THE TOLEDO GLASS COMPANY, OF SAME PLACE.

GLASS-BLOWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,343, dated November 23, 1897.

Application filed May 24, 1897. Serial No. 637,849. (No model.)

To all whom it may concern:

Be it known that we, HENRY JOSEPH COLBURN and MICHAEL JOSEPH OWENS, citizens of the United States of America, residing at Toledo, in the county of Lucas and State of Ohio, have invented new and useful Improvements in Glass-Blowing Machines, of which the following is a specification.

This invention relates to glass-blowing machines, and to that class thereof which is operated both manually and mechanically for effecting the structural purposes of the machine, the object being to provide a glass-blowing machine of this class of improved construction adapted to be advantageously manipulated by one person; and the invention consists in the peculiar construction and arrangement of the several operative elements of the machine, all as hereinafter fully set forth, and more particularly pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a front elevation of a glass-blowing machine embodying our invention. Fig. 2 is a side elevation. Fig. 3 is a sectional view of parts of the frame of the machine and other contiguous parts having relation to the air-supply and the regulation of the same for the blow-iron and is fully described below. Figs. 4, 5, and 6 illustrate detail parts below described.

Referring to the drawings, 2 indicates the frame parts of the machine. A fixed mold-table 3 is secured across the lower end of the frame. The mold, paste or otherwise, comprises two sections 4 4, having suitable bases 5, whereby said sections are adapted to slide in a right line from and toward each other on said table, whereby the mold is opened and closed. The said sections are operated for opening and closing, as aforesaid, by means of a lever 6, pivoted on said table and having two short arms thereon at right angles to the handle thereof, to which arms are pivoted two connecting-bars 7 and 8, and the latter are pivotally connected to said mold-sections, so that by swinging said lever 6 the sections of the mold are operated, as and for the purpose above stated. A blow-iron rest 54 extends across the machine above the mold-table 3.

Provision is made for wetting the mold, as usually required in paste molds after blowing an article, by providing water-distributing receivers 13, connected to one side of the frame of the machine, as in Figs. 1 and 2, to which water is supplied through a pipe 12 from any suitable source. From said receiver the water is conveyed to each section of the mold by two pipes 9 9. The open positions of the mold-sections are indicated in Fig. 1 by dotted lines, and said two pipes 9 9 terminate in two spraying-bulbs 10 10 in such positions that water escaping therethrough when the mold parts are open will be suitably applied to each part or section thereof. The admission of water to said two pipes 9 9 is governed by a piston-valve 14, which enters said receiver 13 from the bottom (see Figs. 1, 2, and 5) and is held normally in a position shown in Figs. 1 and 2—that is, an upward one—and when so held its upper end closes the water-inlets of said pipes 9 9, but by pressing down a foot-lever 16, connected by a chain or cord to said piston, the latter is drawn downward to the position shown in Fig. 5, thereby permitting water to enter said pipes 9 9 and to be delivered therethrough to spray the mold, as stated, the spring 15 carrying the piston upward again when said lever is freed.

A hollow shaft 17 is hung to rotate in suitable bearings at the upper end of the frame and has a gear 18 fixed thereon, on the outer face of which is a circular cam 19. A ratchet-wheel 20 is secured on said shaft 17, Figs. 1 and 4, and by the side of said wheel 20 is a sprocket-wheel 21, free on said shaft 17, but having a ratchet-latch 22 thereon for engagement with the teeth of said wheel 20, said latch being actuated by a spring 23. A sprocket-chain 24 passes over and engages said wheel 21, a strap 25 preferably being attached to one end of said chain and a cord 26 to the opposite end. The movement of said chain 24 on the said sprocket-wheel is, as below described, limited, and hence need not extend far from the wheel on either side. Therefore said strap and said cord are connected to the ends thereof. A weight 27 is suspended on one end of said sprocket-chain indirectly by said strap, and the latter runs against a guide-roller 28, hung on said frame,

whereby said weight is prevented from engaging the frame in its upward and downward movements, as below described.

A shaft 29 is supported across the lower end of the machine, upon which a foot-lever 30 is supported, on the rear end of which is a counterbalance 31, and near the outer end of said lever 30 is attached said cord or chain 26. By working said foot-lever 30 the said sprocket-chain is drawn over said wheel 21, thereby rotating the latter freely; but upon releasing said foot-lever said weight moves downward, thereby causing said sprocket-wheel and the ratchet-wheel 20, engaged thereby through said latch 22 thereon, and the shaft 17 and cam-bearing gear 18, to be rotated momentarily. The said counterbalance 31 on the lever 30 serves to cause the entire effect of the weight 27 to be exerted in rotating said wheel 21 and its said connected parts.

By means of the above-described inexpensive mechanism means are provided, operated by gravity, for adequately governing the supply of air to the blow-iron of a glass-blowing machine, both in respect to the volume and to the duration of the air-supply to said blow-iron.

A shaft 32 is supported in bearings at the upper end of the machine, having a pinion 33 thereon engaging with said gear 18. Said shaft 32 carries thereon a fan-governor 34, having the radial arms, as shown, bearing graduated marks, and fans 35 on said arms adjustable toward and from the axis of said shaft 32, whereby the resistance induced by said regulator to the free rotation of said last-named shaft and to other operative elements connected therewith is varied, for the purpose hereinafter described.

It is obvious that a fan-governor construction containing flat sheet-metal arms, as sometimes made, which are arranged to be so turned in the hub of the governor as to present a face of variable area for air-resistance, may be substituted for that herein shown; but the type of regulator herein shown is preferable in respect to said adjustable features.

A piston 36, adapted to slide within said shaft 17 and a part of said frame, has its free end entering the latter, as shown in Fig. 3. On said frame part is secured a short air-conducting pipe 56, communicating with the cylindrical chamber therein, in which said piston 36 moves, and to said pipe 56 is connected one end of an air-conduit 40, whose opposite end may be connected to any suitable fan or other device for supplying air under pressure. Said piston 36 has on its outer end a flattened head, having a slot therein, as shown, with which a pin on a vibratory lever 37 engages, said lever being pivotally connected by one end to a part of said frame of the machine, as clearly shown, and bearing on its opposite free end a freely-turning roller 38, whose periphery bears against the border of said cam 19 on said gear 18. By means of said rotating cam on the gear 18 said lever 37 is given a vibratory motion of a variable degree of speed during a revolution of said gear 18, and the said motions of the lever 37 are communicated to said piston 36, whereby its free end under the end of said air-supply pipe 56 is moved with gradually-increasing rapidity from the position shown in Fig. 3, in which the air-current is shut off, to one fully uncovering the end of said supply-pipe and then back again to the position shown. The purpose of said movement of the piston 36 is to provide in a machine of this class means for providing an air-supply for blowing a glass article in the mold through the blow-iron and connections below described between the latter and the said chamber to which said air-conducting pipe 56 is connected, which when the glass in the mold is hottest is of little volume, but which volume is gradually increased owing to the action of said cam 19 upon the piston 36, as above described. The said duration of the air-supply is dependent upon the time in which the weight 27 can complete its falling movement after it shall have been raised, as above described, and the speed of said weight-falling movement is adjustable through said fan-governor and the connection of the same with the said pulley 21, which is primarily connected with said weight. If the machine be adjusted for an air-supply of maximum duration, the fans 35 on the arms of the said governor are moved near the extremities of said arms, thereby interposing increased resistance to the rotary motion of the governor and through the latter and said connections therebetween and the said pulley 21, on which said weight hangs, retarding the falling motion of the latter, thus increasing the duration of the air-blast through the blow-iron into an article while being formed in the mold. The volume of air conveyed to the article within the mold is regulated by the cam 19, which for said purpose may be of any suitable outline best adapted to produce a gradual or sudden increase of expanding effect upon an article being blown in the mold or an entire stoppage of air-supply at a given time. The volume of air is adapted ordinarily to be increased while the heat in said article being blown decreases. The said duration of the air-supply is made adjustable, as aforesaid, for the purpose of adapting the action of the machine in this respect to the proper treatment of glass articles containing a greater or less quantity of glass in view of the fact that heavy thick articles require more time or a longer duration of the blowing action for expanding them in the mold than do thinner lighter ones. The blow-iron has a rotary motion imparted thereto, as below described, by means which provide for rotating it a longer or shorter time, whereby the duration of its rotary movements shall correspond to that of the supply of air to said blow-iron. A hollow vertical shaft 41 is suitably connected with said chamber in which the end of the piston 36 operates, as described, by connections

42 and 43, Fig. 3, said hollow shaft being supported in and by certain frame parts, as shown. A tubular blow-iron sleeve 44, whose lower end is adapted to receive the upper end of the blow-iron 53, is supported to be rotated in a part of the frame 2 by a gear 47, having a spline connection therewith, whereby said sleeve may slide in said gear, and the latter is given a rotary motion by a hand-crank on a sprocket-wheel 51, the latter being connected by a chain 52 to a second sprocket-wheel 50 on a shaft 48, on which is a gear 49, engaging said gear 47. The said connection between said hand-crank sprocket-wheel and said sleeve 44 provides for rotating said blow-iron and the glass thereon in the mold by the operator while the article is being blown. A lever 45, pivoted on the frame of the machine, has one end engaging in a concentric groove in said sleeve 44, and to the free end of said lever is attached a cord 46, which is grasped by the operator for raising said blow-iron sleeve 44 off from the end of the blow-iron 53 when the latter, with the blown article, is to be removed. Said blow-iron 53 has a suitable engagement with said blow-iron sleeve 44, whereby the latter rotates the iron. An enlargement 55 on the blow-iron 53 provides for supporting the latter on said blow-iron rest 54 and holding the same while the glass-blowing operation proceeds.

The operation of the above-described devices is as follows: The operator wets the mold, as described, and then operates the lever 6 to open the mold and then, gathering the glass on the blow-iron 53, places the latter in the machine in the position shown in Fig. 1 and closes the mold and at the same time pressing the foot-lever 30 to raise the weight 27 and set the mechanism at the top of the machine in motion, as described, whereby the proper air-supply to the blow-iron is given, and grasping said hand-lever on the sprocket-wheel 51 and turning the latter he, through the same, imparts rotary motion to the blow-iron until the article in the mold is formed and partly cooled. The operater then opens the mold and removes the blow-iron and the blown article thereon from the machine. Then operating the foot-lever 16 water is permitted to flow through the pipes 9 9, thereby wetting the mold parts, as described, after which the operations are repeated for blowing each succeeding article.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, and separately-organized mechanisms, each subject to the manipulation of the operator of the machine, for independent temporary action for admitting air under pressure to said blow-iron, for rotating the blow-iron, and for wetting the mold, substantially as set forth.

2. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, separately-organized mechanisms, each subject to the manipulation of the operator of the machine for independent, temporary action for admitting air under pressure to said blow-iron, for rotating the blow-iron, for wetting the mold, and mechanism coöperating with that which admits said air to the blow-iron whereby the volume of air so admitted is gradually increased during the formation of an article in the mold, substantially as set forth.

3. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, separately-organized mechanisms, each subject to the manipulation of the operator of the machine for independent, temporary action for admitting air under pressure to said blow-iron, for rotating the blow-iron, for wetting the mold, and mechanism whereby the duration of the air flow through the blow-iron is increased or diminished, as required by the quantity of glass in the article being operated upon, substantially as set forth.

4. In a glass-blowing machine, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, for admitting and controlling the flow of air to, and through the blow-iron to the mold, and for increasing and diminishing the duration of said air flow, substantially as set forth.

5. In a glass-blowing machine of the class described, means coöperating with the glass-blowing air-supply of the machine, whereby the duration of said air-supply for action upon an article being blown is made variable, substantially as described.

6. In a glass-blowing machine of the class described, a sectional mold, a mold-table on which the mold-sections are supported for movements in a right line from and toward each other, a blow-iron, means for supporting the blow-iron in operative relation to the mold, means for moving said mold-sections to open and close the mold, separately-organized mechanisms, each subject to the manipulation of the operator of the machine for independent temporary action for admitting air under pressure to said blow-iron and mold, for rotating the blow-iron, and for wetting the mold, substantially as set forth.

7. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, and gravity-actuated mechanism for admitting air under pressure to said blow-iron substantially as set forth.

8. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, and manually-operated mechanism for rotating said blow-iron, substantially as set forth.

9. In a glass-blowing machine of the class described, a mold consisting of two disconnected sections, a table on which said mold-sections are supported for movements in a right line from and toward each other, means for manually sliding said sections to open and close the mold, conducting-pipes conveying and applying water to said mold-sections, a valve in said pipes, and a foot-lever connected with said valve for operating the same, whereby the flow of water through said pipes to the mold-sections is controlled, substantially as set forth.

10. In a glass-blowing machine of the class described, a mold, a blow-iron, means for supporting the blow-iron in operative relation to the mold, and gravity-actuated mechanism for admitting air under pressure to said blow-iron, and for varying the volume of air so admitted, whereby said volume is increased during the blowing of an article in the mold, substantially as set forth.

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