No. 632,486. Patented Sept. 5, 1899.

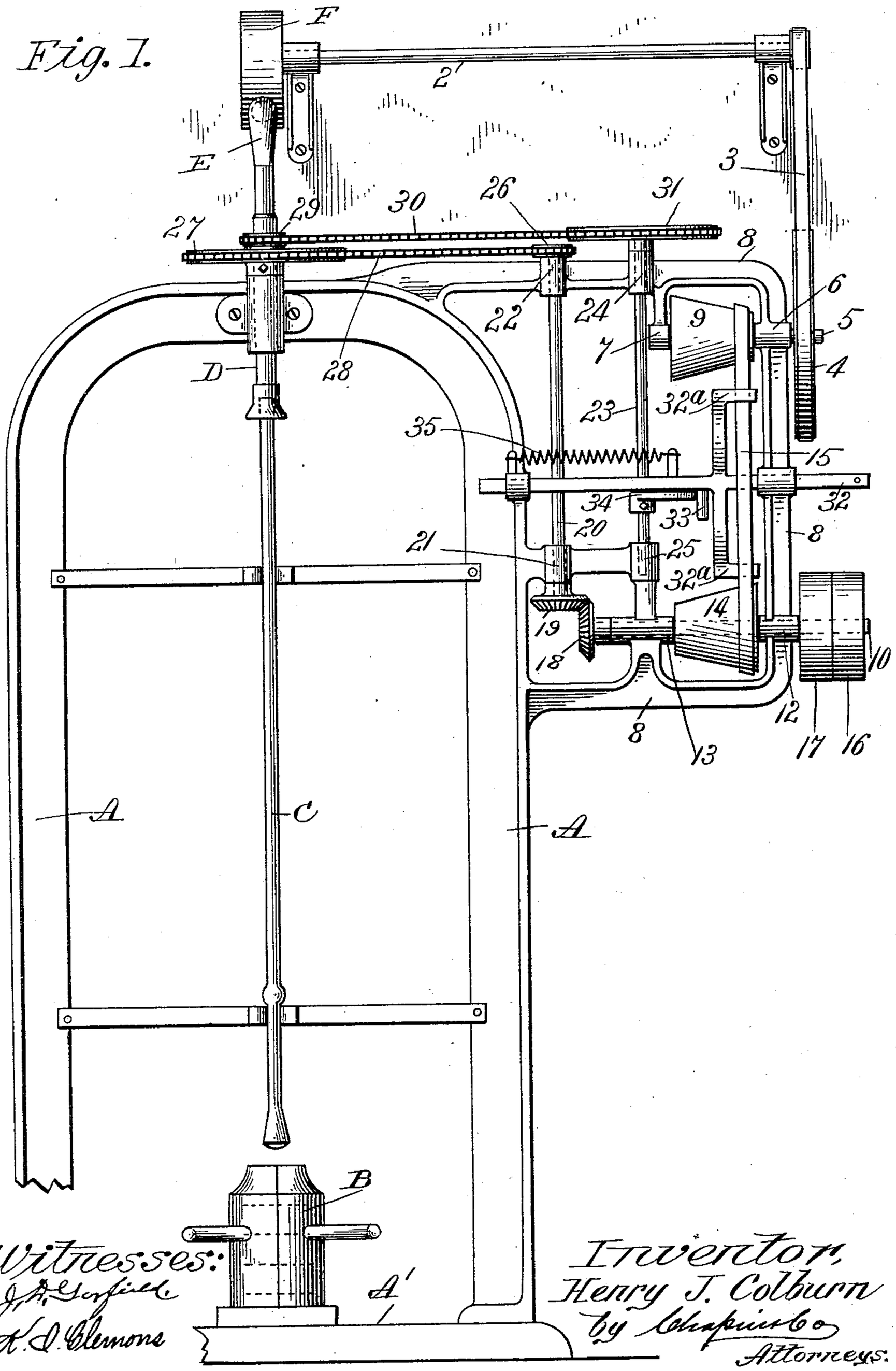
H. J. COLBURN.

AUTOMATIC BLAST REGULATOR FOR GLASS BLOWING MACHINES.

(Application filed Oct. 28, 1897. Renewed July 12, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
J. R. Garfield
L. D. Clemons

Inventor.
Henry J. Colburn
by Chapin & Co
Attorneys.

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Fig. 2.

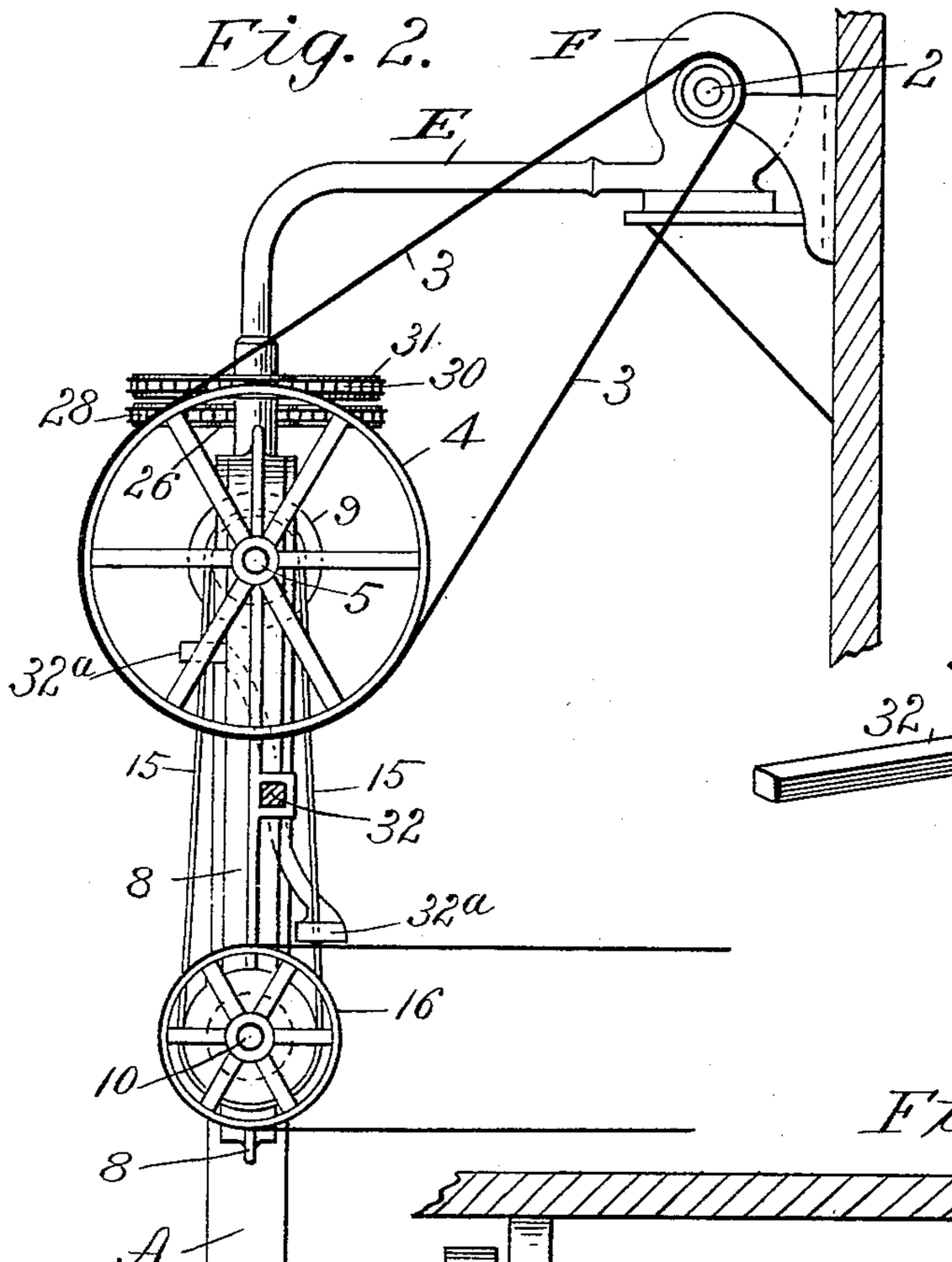


Fig. 4.

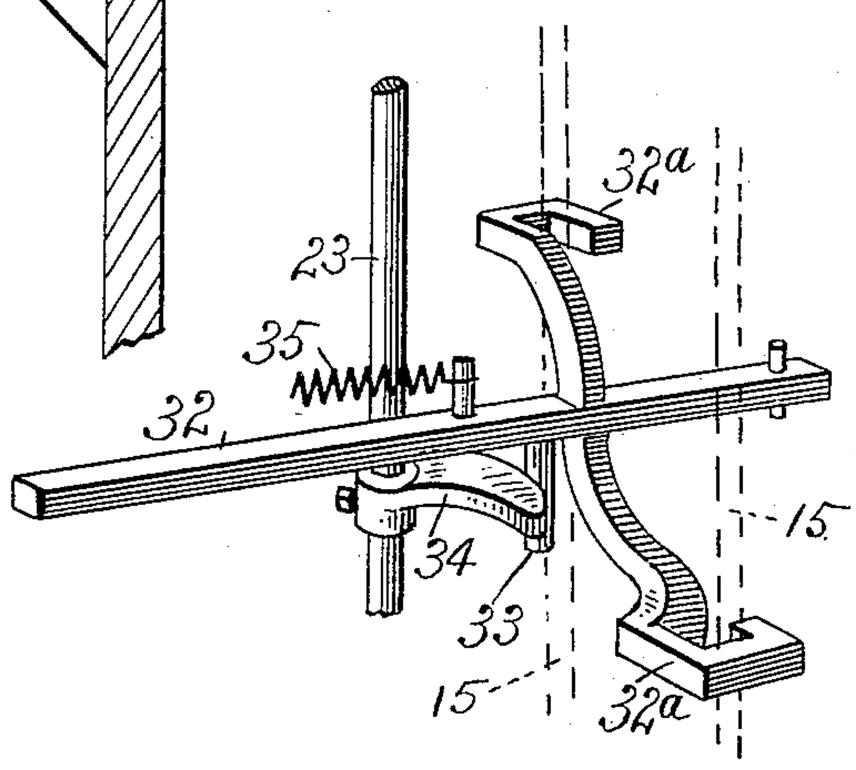
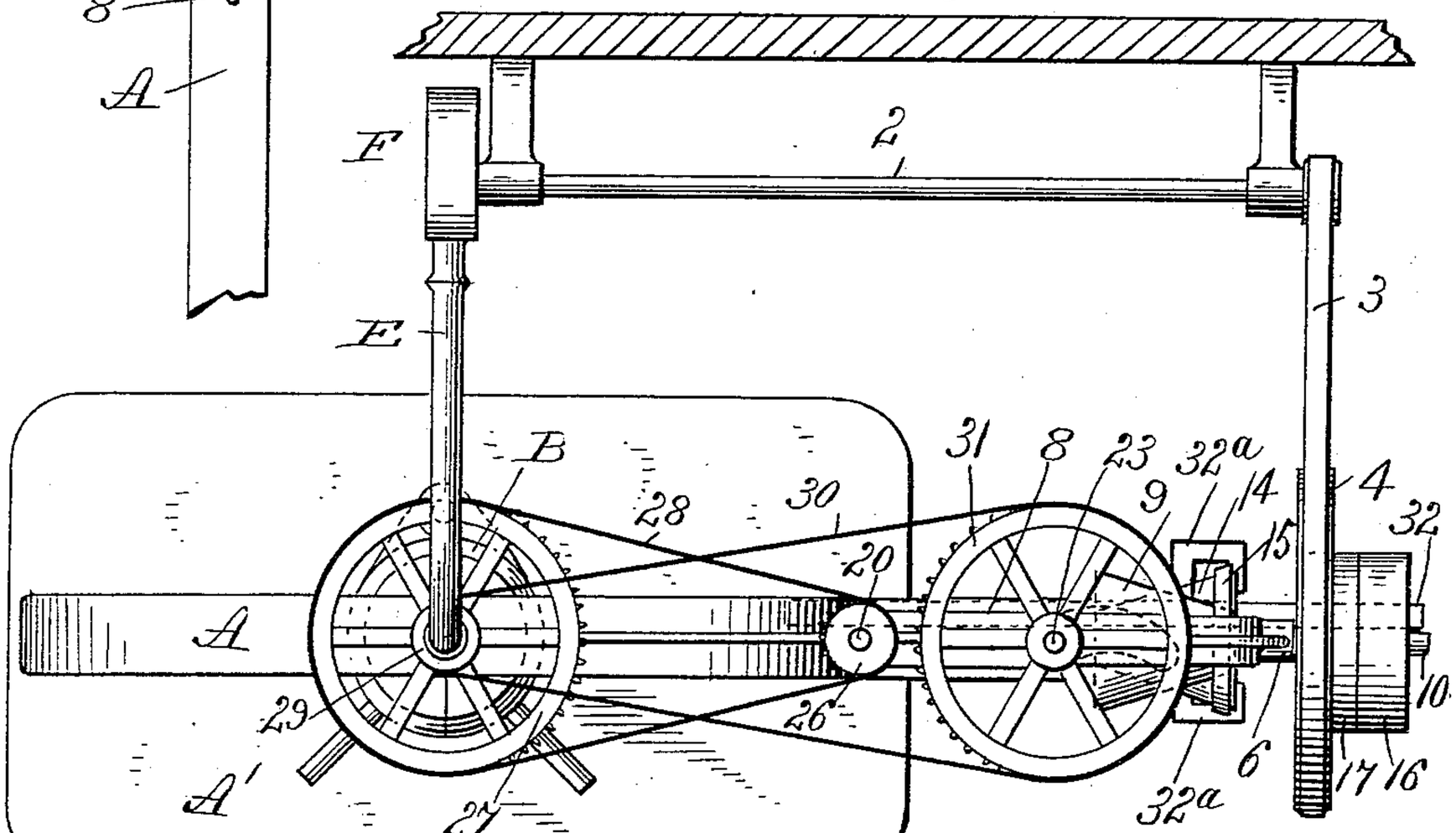


Fig. 3.



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J. D. Garfield
K. D. Clemons

Inventor:
Henry J. Colburn,
by Chapin & Co
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY JOSEPH COLBURN, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO GLASS COMPANY, OF SAME PLACE.

AUTOMATIC BLAST-REGULATOR FOR GLASS-BLOWING MACHINES.

SPECIFICATION forming part of Letters Patent No. 632,486, dated September 5, 1899.

Application filed October 28, 1897. Renewed July 12, 1899. Serial No. 723,558. (No model.)

To all whom it may concern:

Be it known that I, HENRY JOSEPH COLBURN, a citizen 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 Automatic Blast-Regulators for Glass-Blowing Machines, of which the following is a specification.

This invention relates to machines for blowing glass, the object being to provide means for producing a glass-blowing air-current in said machines, which is conducted to and through the blow-iron thereof under an automatically-regulated gradually-increasing force or pressure from the moment said blow-iron with a gathering of hot glass thereon is placed in the machine and supports said glass in the mold until the blowing of the glass article is completed to the end that the glass-blowing air-pressure within said article shall gradually increase as the glass in the mold gradually loses its plasticity by cooling, thereby maintaining such increasing degree of air-pressure during the molding of the article as is demanded for faithfully reproducing in the latter the form of the mold; and the invention consists in the construction and arrangement of suitable mechanism for controlling, regulating, and gradually increasing the force of the air-current, as and for the purposes set forth, substantially as hereinafter described, and more particularly pointed out in the claims.

In the drawings forming part of this specification, Figure 1 represents a part of the frame of a glass-blowing machine in front elevation having my improved pressure-regulating devices applied thereto. Fig. 2 is a side elevation of said regulating devices shown in Fig. 1. Fig. 3 is a top plan view of Fig. 1, and Fig. 4 is a perspective view of a belt-shifting bar and its controlling-cam.

Referring to the drawings, A represents the upright frame of a glass-blowing machine, secured to a suitable base A′.

B represents a sectional mold; C, a removable blow-iron supported vertically over the center of the mold B, the upper end of said blow-iron having an engagement with the lower extremity of a hollow shaft D, supported for rotation in a suitable bearing in the upper part of the frame A and whose upper extremity is connected by a suitable air-conduit E with the casing of a rotary blower F or other similar air-forcing device or suitable source of air-supply, which may be located in such position near the machine that a driving-belt from the latter may be connected therewith. In the drawings said blower F is shown as supported on bracket-hangers on a wall near the machine and a shaft 2, connected with the axis of the blower, extended to one side far enough to receive on a pulley at the end thereof the belt 3 from the driving-pulley 5, fixed on a shaft 5, which is supported in bearings 6 and 7 on a frame 8, which may be either cast on or bolted to the upright frame A, substantially as shown. On said shaft 5, between the bearings 6 and 7, is located the cone-pulley 9. A second shaft 10, parallel with the shaft 5 and below it, is supported in bearings 12 and 13 on said frame. A second cone-pulley 14 is secured thereon, and a belt 15 passes over said two cone-pulleys. The said shaft 10 is the driving-shaft of the regulating mechanism and is provided on its outer extremity with the tight and loose pulleys 16 and 17, from which a driving-belt may be taken to any suitable source of power for rotating the said shaft 10.

The inner end of the shaft 10 is provided with a beveled gear 18, which meshes with a second beveled gear 19, secured to the lower end of a vertical shaft 20, supported for rotation in bearings 21 and 22 in said frame 8, and parallel with said shaft 20 is a second shaft 23, supported for rotation in bearings 24 and a step-bearing 25. The upper end of shaft 20 is provided with a small sprocket-wheel 26, and a larger sprocket 27 is secured on the hollow shaft D in line with said sprocket 26, and a sprocket-chain 28 connects said sprockets. Above said larger sprocket-wheel 27 on the shaft D is a small sprocket 29, connected by a sprocket-chain 30 with the large sprocket 31 on the upper extremity of the shaft 23.

From the above description it is seen that the rotation of the driving-shaft 10 sets in motion the cone-pulley 14 and through the belt 15 the cone-pulley 9, and through the bevel-gears 18 and 19 the vertical shaft 20 is rota-

ted, which in turn rotates the hollow shaft D, imparting a rotary movement to the blow-iron C, which engages with it. From said hollow shaft D movement is transmitted to the vertical shaft 23 by means of the sprocket 29 on said hollow shaft and the sprocket 31 on shaft 23 and the chain 30 running on said two sprockets. By means of the proper variation in the size of the said sprockets the speed of rotation of the shaft 23 is very much reduced compared with the speed of the shaft which drives it.

The function of the slowly-revolving shaft 23 is to impart to the belt 15 a slow transverse movement from one end of the cone-pulleys to the other, and it is accomplished as follows: A shipper-rod 32, preferably square in cross-section or of such construction as to prevent its rotation, is supported in the frame 8 for an endwise-sliding movement in lines parallel with the axes of the cone-pulleys 9 and 14 and is so placed that suitably-located arms 32^a thereon may engage said belt 15 on the driving side of each of said pulleys. A view of this shipper-rod 32 is clearly shown in Fig. 4, together with a portion of the shaft 23. On said shaft 23 is secured a cam 34, whose plane of rotation is slightly below the plane of movement of the shipper-rod 32, and a pin 33 on the latter projects downward for engagement with the edge of said cam 34, by which the shipper-rod is moved and the belt 15 shifted from the left-hand end of said cone-pulleys, as viewed in Fig. 1, to the opposite end thereof, which movement takes place against the tension of a spring 35, one end of which is secured to said shipper-rod and the opposite end thereof to the frame A of the machine, and as soon as the point of the said cam 34 runs off from the pin 33 the contraction of the spring 35 acts to rapidly shift the belt 15 back again to a position on the left-hand end of said cone-pulleys. The speed of rotation of the blower F is thus automatically varied as desired by the movement of the shipper-rod acting on the belt 15, which increases or reduces the speed of rotation of the cone-pulley 9 as said belt moves from one end thereof to the other. While the belt is on said left-hand end of the cones 9 and 14, the fan-blower F is running at its slowest speed and the pressure of air passing from said blower through the blow-iron C is at its minimum point, and owing to the form of said cam 34 the pressure remains stationary at this point long enough to permit the opening of the mold to remove the article formed therein and permit the insertion of another blow-iron with a gathering of glass thereon, from which another article is to be formed, and the speed of rotation of said cam is timed so that the workman has time to effect said change of blow-iron by the time said cam arrives at a point of engagement with the pin 33 of the shipper-rod, whereby the latter immediately begins its transverse movement to shift the belt 15 from its aforesaid position to that shown in Fig. 1, whereby the air-pressure is gradually increased until it reaches its maximum at the point where said cam runs out of engagement with said shipper-rod, thereby letting the spring 35 act thereon, as stated. The said fan-blower, actuated as above described, is driven intermittently fast and slow and at a gradually-increasing speed after an article to be blown is placed in the mold. By a suitable formation of the edge of the cam 34 engaging with the pin 33 any desired graduation of pressure can be obtained between the minimum and maximum points above mentioned, whereby the air-pressure within an article while being blown shall be gradually increased as the glass in the mold gradually loses its plasticity, and a close approximation may be mechanically obtained of the most effective pressure to be used in forming certain articles as determined by the practice of expert glass-blowers using lung-power.

It is obvious that any suitable form of blower for producing air-pressure may be used without departing from the spirit of this invention, it being only requisite that the speed of the blower employed may be capable of control by means of suitable mechanism for gradually increasing the air-pressure in a mold and blow-iron connected therewith.

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

1. In a machine for blowing glass, air-forcing mechanism, means for conducting air from said air-forcing mechanism to an article being blown, and means automatically varying the speed of said mechanism during the blowing of said article, whereby the degree of air-pressure upon the interior thereof is increased during said blowing, substantially as set forth.

2. In a machine for blowing glass, air-forcing mechanism, means for conducting air from said air-forcing mechanism to an article being blown, and means automatically controlling the speed of said air-forcing mechanism, whereby the degree of air-pressure upon the interior of said article is gradually increased during the formation thereof, substantially as set forth.

3. In a machine for blowing glass, air-forcing devices, means for conducting air from said devices into a glass article in process of formation, and mechanism acting automatically to increase the speed of said air-forcing devices and consequently the pressure of the air within said article while the same is cooling, substantially as described.

4. In a machine for blowing glass, comprising a mold, an air-conduit, a blow-iron, and means for supporting the same in operative relation to said conduit and mold, air-forcing devices in connection with said conduit, and means for varying the speed of said air-forcing devices whereby the degree of air-pressure against the interior of an article in proc-

ess of formation in said mold is gradually increased, substantially as set forth.

5. In a machine for blowing glass comprising a mold, an air-conduit a blow-iron and means for supporting the same in operative relation to said conduit and mold, air-forcing devices in connection with said conduit, and means, consisting of a driving and a driven cone-pulley connected by a belt, a driving connection between said driven cone-pulley and said air-forcing devices, and means for shifting the belt on said cone-pulleys to change the speed of the driven pulley, whereby the pressure of air against an article in process of formation in said mold may be varied, combined with means for rotating said driving cone-pulley, substantially as set forth.

6. In a machine for blowing glass, comprising a mold, an air-conduit a blow-iron and means for supporting the same in operative relation to said conduit and mold, air-forcing devices in connection with said conduit, and means consisting of a driving and a driven cone-pulley connected by a belt, a driving connection between said driven cone-pulley and said air-forcing devices, and a cam-operated shipper-bar for variably shifting the belt on said cone-pulleys to change the speed of the driven pulley, whereby variations in the speed of operation of the said air-forcing devices is effected to vary the pressure of air against the interior of an article in process of formation in said mold, combined with means for rotating said driving cone-pulley, substantially as described.

7. In a machine for blowing glass, a blow-iron an air-blower, mechanism for driving said blower at a gradually-increasing speed during the time that a glass article is being formed in the machine, and an air-conduit conducting air from said blower to the blow-iron, substantially as described.

8. In a machine for blowing glass, a blow-iron an air-blower, mechanism for driving said blower at a gradually-increasing speed during the time that a glass article is being formed in the machine, then reducing said speed to a minimum, and again gradually increasing the same, and an air-conduit conducting air from said blower to the blow-iron, substantially as set forth.

9. In a machine for blowing glass, an air-blower, a conduit conducting air from said blower to a blow-iron, a blow-iron and mechanism imparting, successively, to said blower fast and slow movements, whereby successively-varying degrees of air-pressure are produced, substantially as set forth.

10. In a machine for blowing glass, air-forcing mechanism, an air-duct leading said forcing mechanism to an article in process of fabrication, and means automatically controlling the air-forcing mechanism to vary the pressure of air propelled by said air-forcing mechanism to the article, as the blowing progresses, all combined substantially as described.

HENRY JOSEPH COLBURN.

Witnesses:
W. H. HARRISON,
HENRY C. TRUESDALL.