No. 625,701. Patented May 23, 1899.

C. Z. F. ROTT & T. C. STEIMER.

GLASS BLOWING MACHINE.

(Application filed Aug. 16, 1898.)

(No Model.) 4 Sheets—Sheet 1.

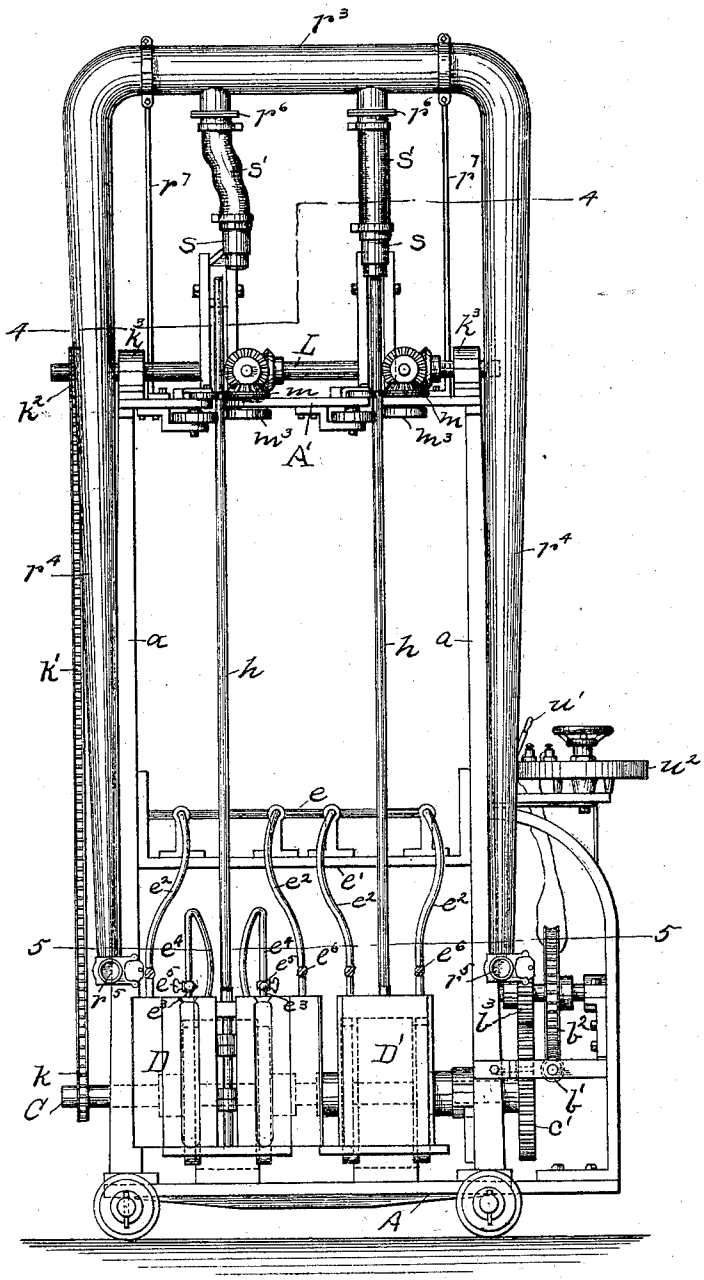

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

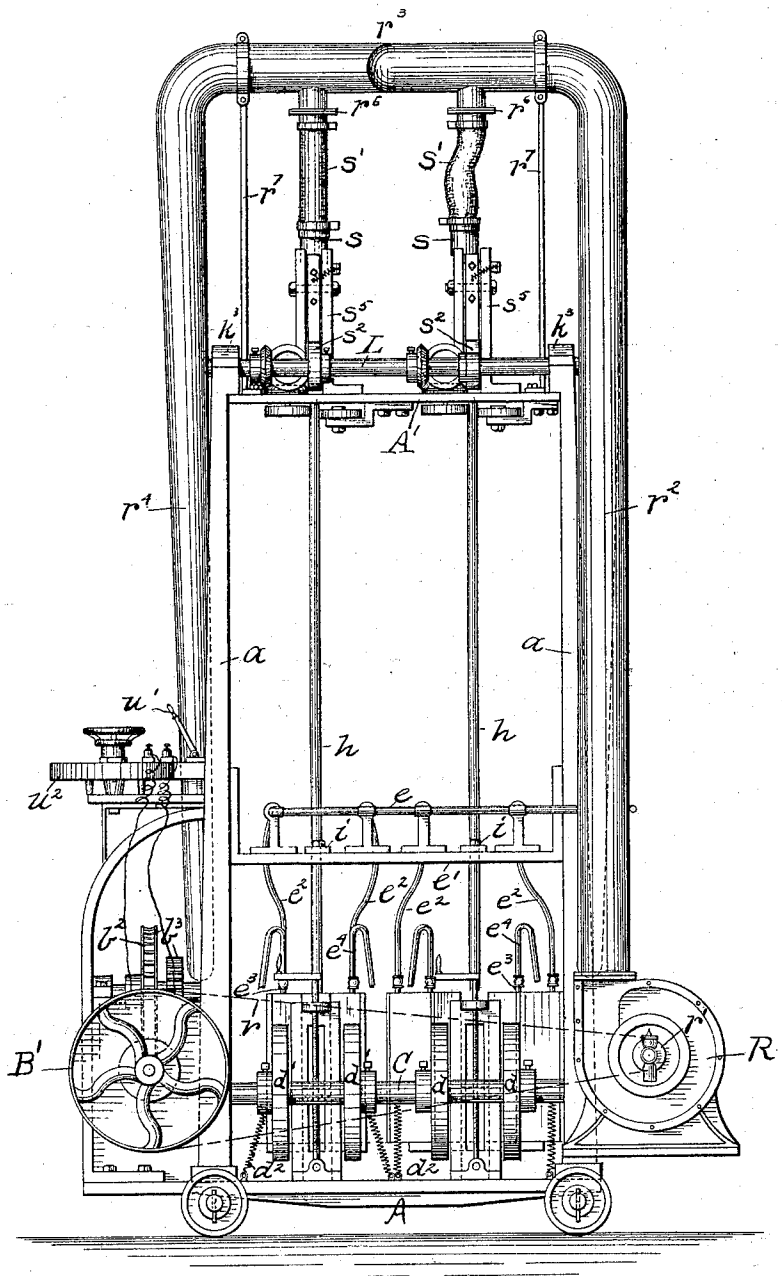

Fig. 2

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(No Model.) 4 Sheets—Sheet 3.

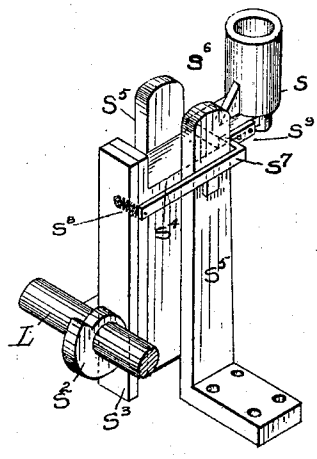

Fig. 6

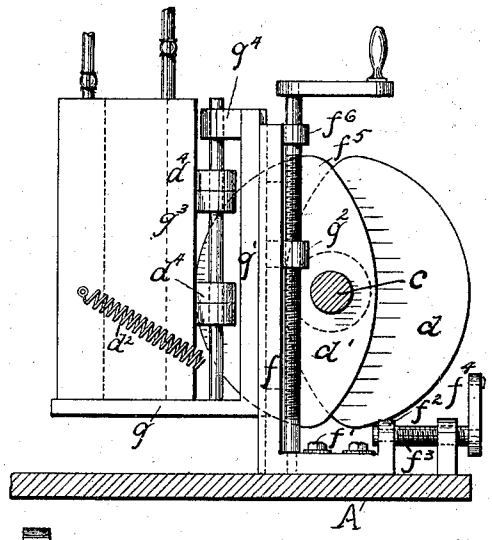

Fig. 7

Fig. 5

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(No Model.) 4 Sheets—Sheet 4.

Fig. 4

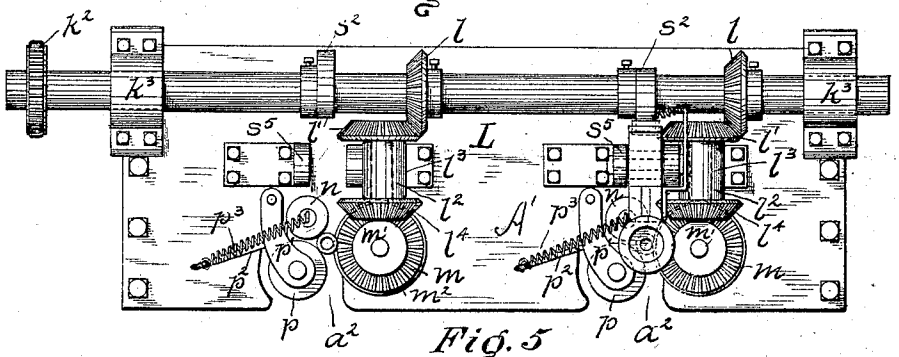
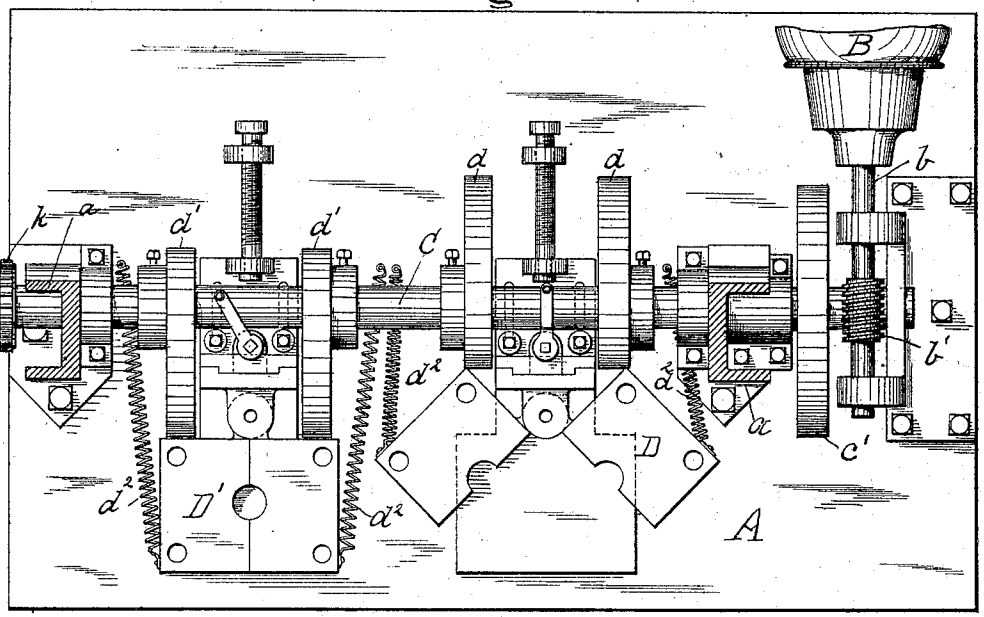


Fig. 5



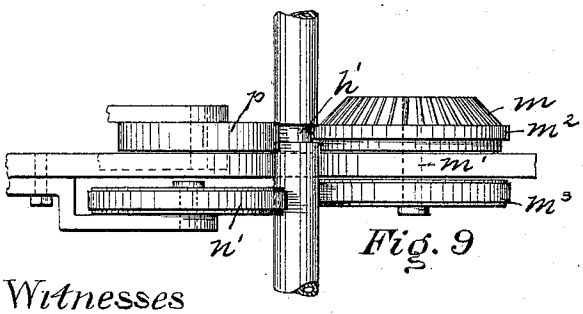


Fig. 9

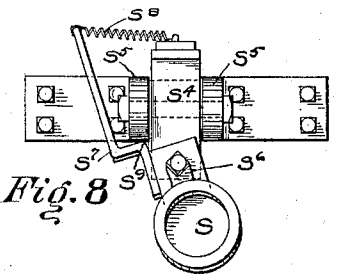


Fig. 8

Witnesses

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Grace C. Raymond

Inventor

Christian F. F. Rott

and Theodor C. Steimer

By Kay & Gotten

Attys

UNITED STATES PATENT OFFICE.

CHRISTIAN Z. F. ROTT, OF PITTSBURG, AND THEODORE C. STEIMER, OF CHARLEROI, PENNSYLVANIA; SAID STEIMER ASSIGNOR TO SAID ROTT.

GLASS-BLOWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,701, dated May 23, 1899.

Application filed August 16, 1898. Serial No. 688,685. (No model.)

To all whom it may concern:

Be it known that we, CHRISTIAN Z. F. ROTT, a resident of Pittsburg, in the county of Allegheny, and THEODORE C. STEIMER, a resident of Charleroi, in the county of Washington, State of Pennsylvania, have invented a new and useful Improvement in Glass-Blowing Machines; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to machines for blowing glass, its purpose being to produce a machine of this character which is extremely simple in construction, while all the necessary parts for the running of the same can be supported upon a single frame, the machine being thus self-contained, so that it can be moved from place to place in the factory.

The machine comprises, generally stated, a frame having blow-molds thereon—for example, two molds which are hinged together and opened by springs, while they are closed and held closed during the blowing operation by suitable cams mounted on a horizontal cam-shaft between the molds, a motor supported on the machine and geared to this shaft by worm-wheel gearing, a blower supported on the machine and operated by the motor for furnishing air, both for the blowing of the articles and for cooling purposes, around the machine, means for supporting the blowpipe without enlarging it, rotary friction-wheels supporting the pipe in position and rotating the same, peculiar connections between the air-supply pipe and the blowpipe, in which the connecting air-supply socket is coupled with the blowpipe and withdrawn therefrom and moved out of line therewith, so that a continuous stream of air will not be forced through said air-supply pipe, and adjustable means by which the molds can be raised and lowered, according to the length of the article to be formed therein, so that the same length of blowpipe can always be employed.

The particular points of invention desired to be covered will be specifically set forth and claimed.

To enable others skilled in the art to make and use our invention, we will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a face view of the machine. Fig. 2 is a back view thereof. Fig. 3 is a side view. Fig. 4 is a cross-section on the line 4 4, Fig. 1. Fig. 5 is a cross-section on the line 5 5, Fig. 1. Fig. 6 is a perspective view of the mechanism for operating the blowpipe-socket. Fig. 7 is a detail for the straightening of the molds supporting the adjusting and operating mechanism. Fig. 8 is a top view of mechanism for operating blowpipe-socket, and Fig. 9 is a detail of mechanism for turning blowpipe.

Like letters of reference indicate like parts in each view.

The machine is mounted on the truck A, by which it can be moved from place to place in the factory and from which bed or truck extend up the standards *a a*, which give support to the main part of the operative mechanism. On this bed or truck is secured the motor B, the motor-shaft *b* of which passes forward about in line with the standard *a* and carries the worm *b'*, which meshes with the worm-wheel b^2, driving the pinion b^3, which meshes with the gear-wheel *c'* on the end of the cross or cam shaft C, which extends across the machine and carries the cams *d d* and *d' d'*, which operate the molds D and D', respectively. These molds are formed with hollow walls and have suitable connections by which water may be carried through the same, so as to maintain their inner faced surfaces at a temperature below that at which the temperature would be affected by the heat of the glass, as set forth in an application for patent filed by us the 7th day of June, 1898, Serial No. 682,828. To supply water to these hollow molds, we employ the main supply-pipe *e*, supported on the cross-bar *e'*, to which hose connections are made, according to the position in which the machine is placed in the factory, and from which flexible hose connections e^3 are made with each section of each mold, the water after passing through the same being led out through pipes e^3 and flexible connection e^4 to a point of escape, the flow of the water through the molds being controlled by valves e^5 and e^6.

The mold-cavities can be of any suitable shape, according to the article formed, those illustrated being for the formation of straight

bodied lamp-chimneys, as this is an extremely simple form. The two mold-sections are simply hinged together, as is ordinarily the custom in blow-molds, while in order to open the molds we employ the springs d^2, which are connected to suitable stationary parts of the machine, as shown, and are of sufficient strength to draw the mold-section open, as such movement is permitted by the cams operating the mold. These cams d d and d' d' are arranged, as shown, to close the molds and to hold them closed for a sufficient length of time to provide for the blowing of the articles and then to permit the gradual opening of the same by the springs d^2. The two sets of cams are set at right angles to each other, so that one mold will be open while the other is closed, this being found to be a convenient system in the working of a machine having two molds thereon, though where a larger number of molds are employed they can be arranged to open and close at any fixed periods, according to the best workings of the machine.

As it is desirable in the running of such machines to always employ the same length of blowpipe, no matter what article is being formed, we provide means for adjusting the blow-molds vertically, according to the height of the body thereof, this being shown more clearly in Fig. 7. Secured to the bed A is the bracket f, which is bolted thereto by bolts f', passing through slotted ways, so that the bracket f may be adjusted forward and back to bring the mold into the exact position desired, the bracket having the lug f^2, with which the adjustable screw f^3 engages, said screw passing through the pivot f^4 upon the bed A. The upright portion of the bracket f has a vertical slot formed therein, as indicated in dotted lines, and in front of the bracket is the platform g, provided with the upright portion g', having a tongue-and-grooved connection with the bracket f, as shown in Fig. 5, and provided with a lug g^2, which extends through the vertical slot of the bracket f, said lug having a threaded hole extending vertically through the same with which the adjusting-screw f^5 engages, said adjusting-screw being mounted in a seat in the face of the bracket f and in the lug f^6 at the top thereof and being provided with an ordinary crank for turning the same.

The blow-mold sections rest upon the platform g, and the pivot-pin g^3 passes through a lug g^4 at the top of the standard g' on the platform and enters into a seat in the platform itself, while it passes through the hinges d^4 of the mold-sections, so serving both to hinge together the mold-sections and mount them upon the platform. The platforms carrying the molds can be adjusted vertically through this lug g^2 by turning the adjusting-screw f^5, while the bracket f can itself be adjusted back and forth, if found necessary, by loosening the bolts f' and turning the adjusting-screw f^3, the bracket being then firmly locked in place.

When blowing articles, it is necessary that the blowpipes should be supported in proper relation to the molds, and for this purpose guides near each end of the blowpipes are necessary. The lower guides can be made very simple in construction, being nothing more than flaring portions of forks i, extending out from the cross-bar e', secured to the standards a, which cross-bar also supports the water-supply pipe e, the lower portion of the cylindrical blowpipes h entering these forked guides. It is necessary to support the blowpipes vertically, and it is also desirable for the handling of the same that they shall have no lugs or rings of greater thickness than the bodies thereof, as such lugs interfere with the manual setting of the pipe in preparing the blank for inserting in the machine. It is also necessary to lock and hold the blowpipes in direct axial line with the mold while rotating the same. To accomplish these ends, we employ the following construction: On the end of the cross or cam shaft C we place a sprocket k, from which a sprocket-chain k' extends up to the sprocket k^2 on the cross-shaft L, which is mounted in suitable bearings upon the standard a, as more clearly shown in Fig. 4. This cross-shaft operates both the blowpipe-rotating mechanism and the connections between the air-supply pipes and the blowpipes. To rotate each blowpipe, we employ a bevel-pinion l on the shaft L, which meshes with the bevel-pinion l' on the shaft l^2, (shown in dotted lines within the bearing l^3,) said shaft carrying the bevel-pinion l^4 at its opposite end. The bearing l^3 is mounted upon the top plate A' of the machine-frame just in front of the cross-shaft L, the bearings k^3 for the cross-shaft being also secured directly to said bed-plate. Mounted in the bed-plate is a shaft m', (shown in dotted lines,) carrying on the upper end thereof the combined bevel-pinion and friction-wheel m, this wheel, as shown, having a lip m^2 extending out beyond its gear-face, which lip, as shown in the enlarged detail view Fig. 9, fits within the recess h' of the blowpipe h and gives support thereto, while said wheel by its contact upon the blowpipe rotates the same at a speed corresponding to the respective surface speeds of the wheel and pipe. To increase the frictional action, the shaft m' also carries below the top plate A' the friction-wheel m^3, which may have its surface covered with leather or like material to bind upon the blowpipe. As seen in Fig. 4, a recess a^2 is formed in the body of the top plate A', into which the blowpipe enters, so as to contact with the driving-wheel m. In order to hold the blowpipe in proper position, we employ the friction-wheels n', secured upon a shaft mounted in the top plate, one above and the other below the same, in position to hold the blowpipe against backward movement. To

hold the blowpipe against both the the driving-wheel m and the centering-wheel n, we employ the spring-operated wheel p, carried on the arm p', mounted on the top plate and held in such position that it bears upon the blowpipe forward of the center thereof and so holds it in contact with the driving-wheel m and the centering-wheel n. The lever p', carrying this wheel p, has the arm p^2, a spring p^3 being connected to the outer end of this arm and to the top of the shaft carrying the wheel n, so as to draw the wheel p in toward the driving-wheel m. The arm p^3 is employed to give a more yielding action to the holding-wheel p. With this construction of supporting and driving mechanism it is only necessary to place the blowpipe into the fork i with its groove in line with driving-wheel m and force it against the spring-wheel p, which will yield sufficiently to let it pass the same, and then spring back and hold it in contact with the driving-wheel m, spring-wheel p, and centering-wheel n in position to be rotated during the blowing operation.

In order to provide the necessary air under pressure for blowing the articles, we employ a rotary blower R, mounted on the truck A, as shown in Fig. 2. This blower is driven from the band-wheel B' on the motor-shaft b by means of a belt r, extending to a band-wheel r' on the blower-shaft. From the blower-shaft the air-pipe rises, as shown at r^2, and extends over above the body of the machine, as at r^3, it being also preferred that two branches thereof shall extend downwardly along the sides of the machine, as at r^4, so as to provide for distributing air around the machine and keep the parts cool. The upper horizontal portion r^3 of the blowpipe is supported by the arms r^7, extending up from the top plate a, and flexible hose branch pipe S' extends downwardly from this upper blowpipe-section r^3, at the base of which are the blowpipe sockets or couplings s, these sockets or couplings having seats which fit over and make close connections with the blowpipes h when the article is to be blown. The side pipes r^4, as shown, gradually decrease in diameter, while they extend down to about the level of the top of the molds. At this point they have valves r^5, which control the escape of the air, while valves r^6 in the branch pipes S' regulate the air passing to the blowing-sockets s. These valves may be ordinary slide-valves of the simplest form, but by the regulation of their openings the desired pressure for blowing can be accurately adjusted, while the rotary blower R runs at a regular speed.

No controlling mechanism for either varying or cutting off the air is employed, because it is found that but a slight pressure is required, and it may be constant when operating, while by the raising of this socket the air-supply to the blowpipe is cut off, and the air escaping from the pipe aids in the cooling of the mechanism and those operating the machines.

To give the necessary vertical movement to the connecting socket or coupling S, we employ the cam s^2, mounted on the shaft L and operating on the depending arm s^3 of the lever s^4, carrying the socket s and mounted in brackets s^5, secured to the top plate A'. The lever s^4 may have the socket s secured directly thereto, but we find it desirable to draw this socket out of line with the blowpipe when it is raised therefrom, and for this purpose we employ the following mechanism: The socket s has a lug s^6 extending backwardly from the same, which lug is itself pivoted upon the lever s^4, and secured to one side of this lug s^6 is the arm s^7, which extends outwardly in line with one of the brackets s^5 and thence backwardly parallel with said bracket without contact therewith, and spring s^8, connecting the free end of this arm s^7 with the lever s^4. This arm s^7 is so located that when the socket s is raised the inner face s^9 of the arm will press against the front face of the bracket s^5, which will serve to force the lug s^6 and with it the socket s over to one side out of line with the blowpipe. This action takes place when the cam s^2 strikes the depending arm s^3 and raises the socket. When, however, the cam frees the arm s^3, so that the weight of the socket s causes it to drop down upon the blowpipe, the face s^9 of the elbow-arm s^7 is drawn from contact with the bracket s^5 and the spring s^8 will then draw the arm s^7 toward it and so swing the socket s into line with the blowpipe as it is lowered onto the same. By this construction whenever an article is to be blown the socket passes directly upon the top of the blowpipe and makes a tight joint therewith; but as soon as the blowing is completed the cam raises the socket and it is pushed over to one side out of line of the blowpipe and all liability of the current of air blowing down into the blowpipe which might affect the article therein is prevented.

The connections for the electric wire are made to the switch-boxes u, having the switch u' and the resistance-box u^2, through which the speed of the motor is controlled.

The operation of the machine is extremely simple. As the molds are maintained cool by water passing through their hollow chambers around the molding-walls thereof, as above described, there is no necessity for dipping or spraying water upon them, and consequently the only movements necessary are the simple hinge opening and closing movements of the ordinary glass molds. The two molds, as above stated, are made to open and close successively, one being opened when the other is closed, and the molds are fed by the operator alternately, it only being required that he will place the blowpipe carrying the marvered blank in position and withdraw the finished blown article. To do

this, he simply guides the blowpipe into the lower guides *i*, holding the groove *h'* in line with the driving-roll *m*, so that its lip m^2 will enter the groove *h'* and by slight pressure push out of the way the spring-actuated roll *p*, the blowpipe being forced against the centering-roll *n'* and being thus inclosed within the cluster of rolls and driven by friction-wheel *m* and its accompanying friction-roll m^3 while held in proper axial line. After the blowpipe carrying the blank has been placed in this position by means of the cams *d d* or *d' d'* the mold D or D' is closed around the blank, and at the same time the blowing-socket *s* of the air-supply pipe is lowered onto the blowpipe and makes a sufficiently tight joint therewith to force the air through the pipe into the blank and expand it within the mold while it is being rotated by the mechanism above described, and as soon as the blowing is completed this blowing-socket *s* is raised and drawn out of line with the blowpipe and the mold is opened, and the blowpipe carrying the finished blown article can then be withdrawn. In making the connection of the socket *s* of the air-supply pipe with the blowpipe, as the cam s^2 permits the lowering of this socket down upon the blowpipe, the spring s^8, drawing on the arm s^7, draws the socket *s* as it swings on its lug s^6 into line with the blowpipe, the contacting face s^9 of the arm s^7 passing out of contact with the standard or bracket s^5. When the blowing is completed, the cam s^2, pressing on the depending arm of the lever s^4, raises the standard from the blowpipe, and as it is raised the contacting face s^9 of the arm s^7 strikes the face of the bracket s^5 and forces the socket out of line with the blowpipe, so that there is no possibility of further pressure from the blowpipe affecting the article blown, the air simply being discharged in downward course over the machine and assisting in cooling the parts. In this way without the use of any automatic valves varying the pressure a proper blowing-pressure to expand the article is obtained and finished articles of even walls and fine finish are produced. The blowing operation can be carried on rapidly, the only necessity being to keep both molds filled, and an ordinary machine having two molds is capable of producing two thousand or more blown articles during a term.

In case it is desirable to employ a mold which is larger or longer than the one last used provision is made for raising or lowering the mold-platform and adjusting it to exact position, so that the same length of blowpipe can always be employed. A further advantage is found in the fact that the blowpipe itself has no enlargements on it which would interfere with the usual blowing operations in marvering and otherwise preparing the blank for the blowing-machine.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a glass-blowing machine, the combination with a blow-mold, of a blowpipe having a central passage extending entirely through the same and having an annular groove extending below the ordinary contour of the handle portion of the blowpipe, a lip supported by the machine-frame and engaging with a portion only of said groove, means for rotating said pipe, and a reciprocating air-feeding connection engaging with the end of the blowpipe, substantially as set forth.

2. In a glass-blowing machine, the combination with a blow-mold, of a blowpipe having a central passage extending entirely through the same and having an annular groove extending below the ordinary contour of the handle portion of the blowpipe, a rotating and pipe-supporting means engaging with said groove, and a reciprocating air-feeding connection engaging with the end of the blowpipe, substantially as set forth.

3. In a glass-blowing machine, the combination with a blow-mold, of a blowpipe having an annular groove thereon, a roll or wheel having an annular tongue engaging with said groove and supporting said pipe, substantially as set forth.

4. In a glass-blowing machine, the combination with a blow-mold of a blowpipe having an annular groove therein and a cluster of rolls fitting around the blowpipe, one of said rolls having an annular tongue engaging with the groove of the blowpipe, and one of said rolls being power-driven, substantially as set forth.

5. In a glass-blowing machine, the combination with a blow-mold of a blowpipe, a plate having a recess through which the blowpipe enters, a power-driven roll mounted on a shaft extending through said plate and carrying a friction-roll below said plate, a guiding-roll mounted on said plate, and a spring-operated roll carried on a lever mounted on said plate, substantially as set forth.

6. In a glass-blowing machine, the combination with a blow-mold of a blowpipe, a power-driven roll engaging with the blowpipe, a guide-roll mounted in a stationary bearing, and a spring-operated roll carried on a lever having a long arm and a spring connected to said long arm, substantially as set forth.

7. In a glass-blowing machine, the combination of a blow-mold formed of two sections mounted on a vertical stationary hinge, a blowpipe supported above the same, separate springs connected to each mold-section and to the machine-frame for opening the mold, a cross-shaft extending behind said mold and separate cams carried thereby, each operating upon one mold-section to close the mold, substantially as set forth.

8. In a glass-blowing machine the combination of a blow-mold, a blowpipe supported in line therewith, a vertically-adjustable mold-supporting platform on which the mold rests, and a horizontally-adjustable supporting-bracket carrying the platform, substantially as set forth.

9. In a glass-blowing machine, the combination with a mold of the bracket f having a vertical slot therein, a mold-supporting platform g provided with a lug g^2 extending through said slot, and an adjusting-screw in the bracket engaging with said lug, substantially as set forth.

10. In a glass-blowing machine, the combination with a mold, of the bracket f having a vertical slot therein, a mold-supporting platform g provided with a lug g^2 extending through said slot, and an adjusting-screw in the bracket engaging with said lug, the platform and bracket having tongue-and-grooved faces engaging with each other, substantially as set forth.

11. In a glass-blowing machine, the combination of a movable truck carrying a frame, a hinged sectional blow-mold mounted thereon; a motor supported on said frame, a rotary blower on said frame and power connections between the motor and blower, and an air-pipe extending from said rotary blower and connected to a vertically-moving socket engaging with the blowpipe, substantially as set forth.

12. In a glass-blowing machine, the combination of a movable truck carrying a frame, a hinged sectional blow-mold mounted thereon, a motor supported on said frame; a rotary blower on said frame and power connections between the motor and blower; an air-pipe extending from said rotary blower, and connected to a vertically-moving socket engaging with the blowpipe, and air-pipes extending downwardly at the sides of the machine having valves at their lower ends, substantially as set forth.

13. In a glass-blowing machine, the combination with a blow-mold of a blowpipe supported in line therewith, and a blowing-socket having a flexible connection with the air-supply pipe, said blowing-socket moving both vertically and horizontally, so as to be drawn down upon the blowpipe, and lifted and drawn out of line therewith, substantially as set forth.

14. In a glass-blowing machine the combination with a blow-mold of a blowpipe mounted in line therewith, and a vertically and horizontally movable blowing-socket connected with the air-supply pipe, adapted when lowered to engage with the blowpipe, and when raised to be drawn by its side movement out of line with the blowpipe, substantially as set forth.

15. In a glass-blowing machine, the combination with a blow-mold of a blowpipe supported in line therewith, an air-supply pipe having a flexible depending pipe engaging with a blowing-socket, a lever carrying said blowing-socket, and having a depending arm and a cross-shaft carrying a rotary cam engaging with said arm, substantially as set forth.

16. In a glass-blowing machine, the combination with a blow-mold of a blowpipe supported in line therewith, an air-supply pipe having a flexible pipe engaging with a blowing-socket, a lever mounted in a suitable bracket on the machine, a rotary cam operating said lever, said blowing-socket having a lug pivoted to said lever and carrying an arm adapted to contact with the supporting-bracket, substantially as set forth.

17. In a glass-blowing machine, the combination with a blow-mold, of a blowpipe supported in line therewith, an air-supply pipe having a flexible pipe engaging with a blowing-socket, a lever mounted in a suitable bracket in the machine, a rotary cam operating said lever, said blowing-socket having a lug pivoted to said lever and carrying an arm adapted to contact with the supporting-bracket, and a spring connecting said arm and the main lever, substantially as set forth.

In testimony whereof we, the said CHRISTIAN Z. F. ROTT and THEODORE C. STEIMER, have hereunto set our hands.

CHRISTIAN Z. F. ROTT.
THEODORE C. STEIMER.

Witnesses:
J. C. METZGAR,
JOHN S. RODGERS.