

F. WOODRUFF.

APPARATUS FOR FIRE POLISHING AND FINISHING GLASSWARE.

(Application filed July 20, 1900.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2.

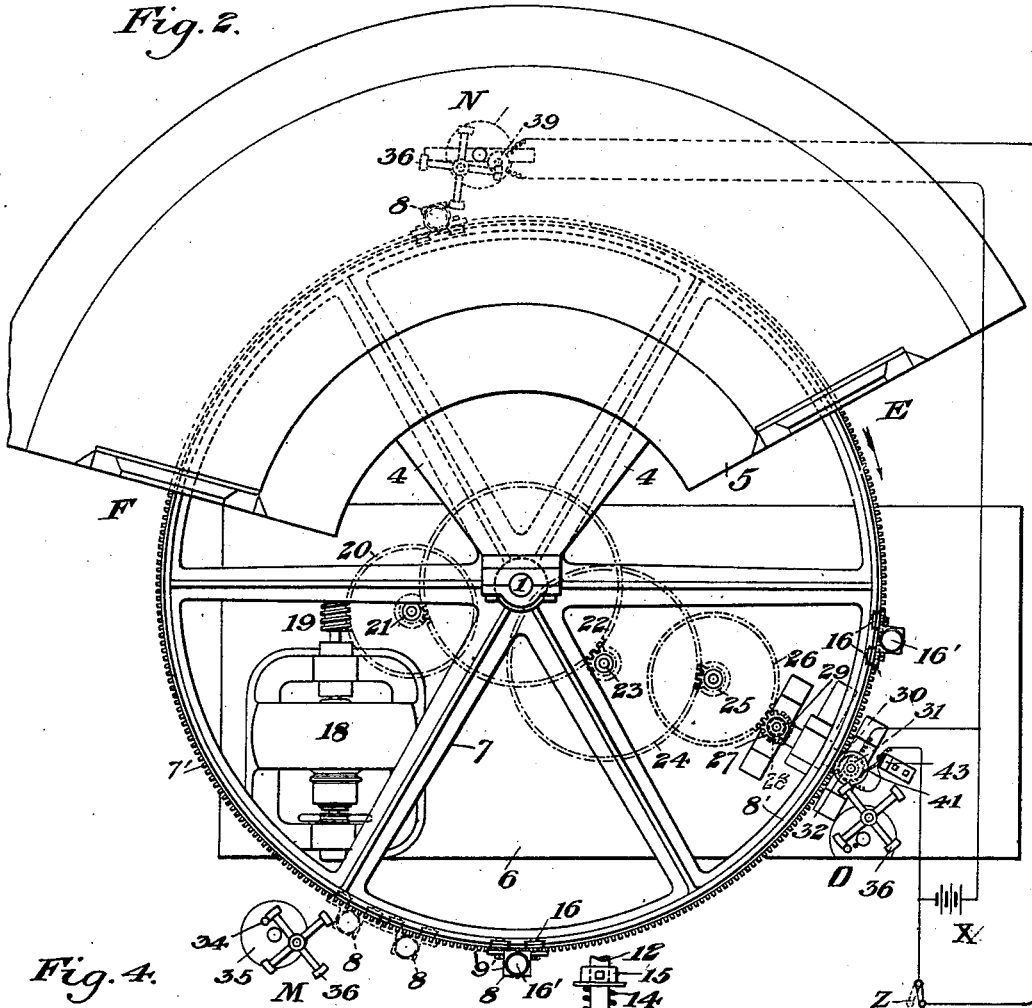


Fig. 4.

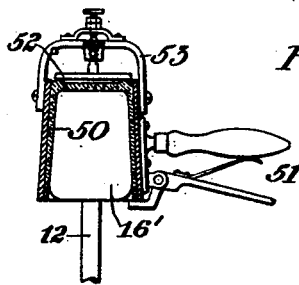
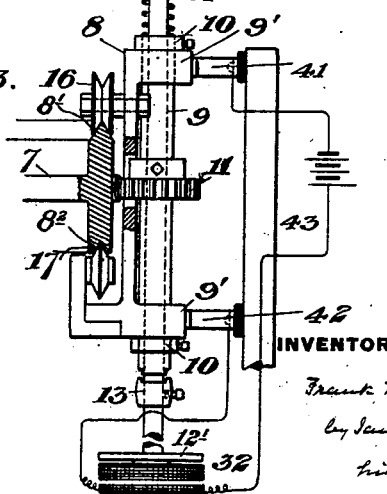


Fig. 3.



WITNESSES.

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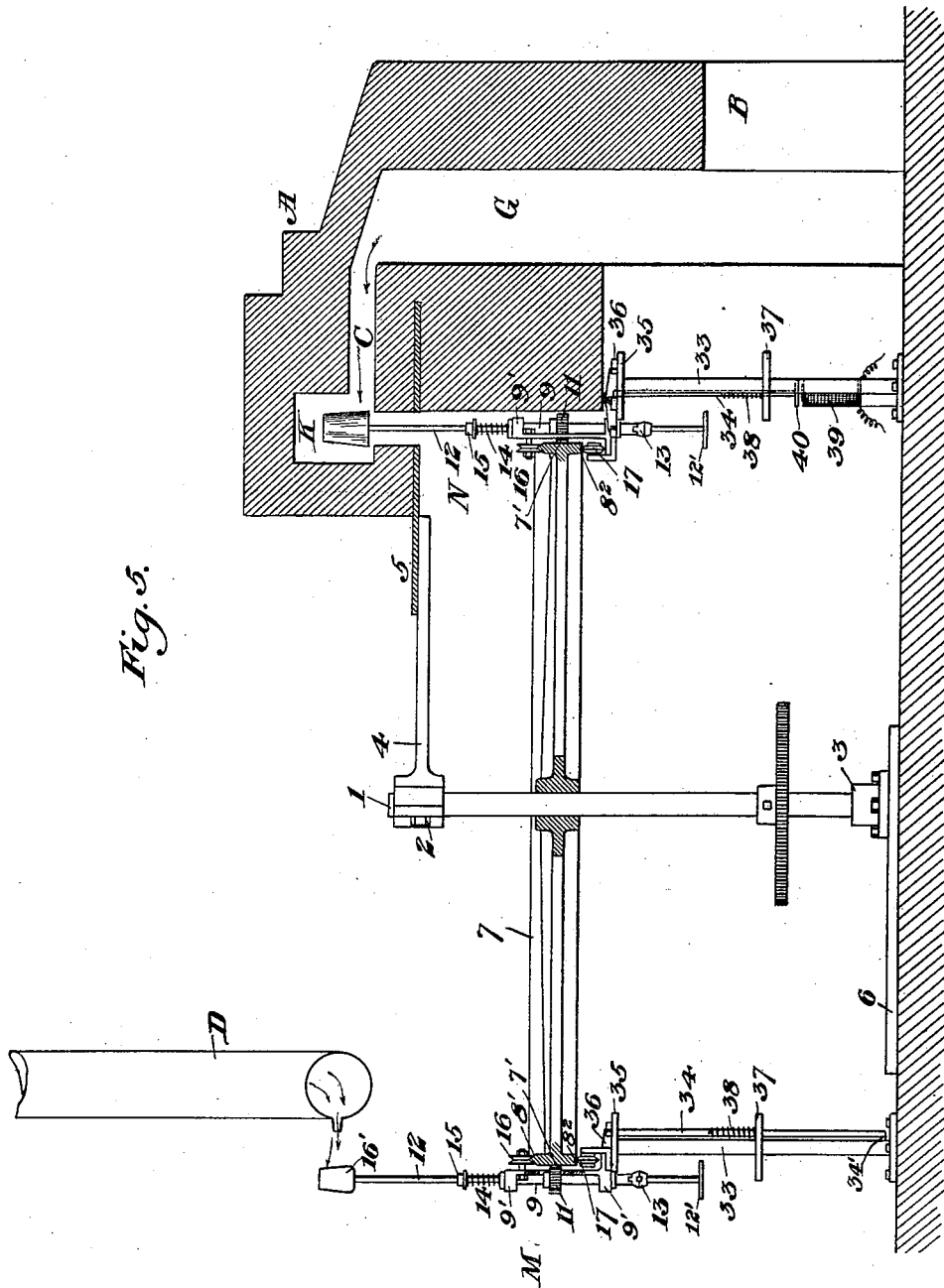
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3 Sheets—Sheet 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

FRANK WOODRUFF, OF ROCHESTER, PENNSYLVANIA, ASSIGNOR TO
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APPARATUS FOR FIRE POLISHING AND FINISHING GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 676,551, dated June 18, 1901.

Application filed July 20, 1900. Serial No. 24,305. (No model.)

To all whom it may concern:

Be it known that I, FRANK WOODRUFF, of Rochester, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Fire Polishing and Finishing Glassware, of which the following is a specification, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of my improved apparatus. Fig. 2 is a plan view of the same. Fig. 3 is a detached view of the punty-holding frame. Fig. 4 is a sectional view of the finishing-cup. Fig. 5 is a vertical sectional view of the apparatus.

Like symbols of reference indicate like parts in each.

My invention relates to an improvement in fire polishing and finishing articles of glassware—either pressed ware as it comes from the molds or blown ware as it comes from the cracking-off and grinding mechanisms.

In the manufacture of pressed glassware, such as tumblers, it is customary to form the tumbler in a mold, the molten glass being carried to the mold on a punty and pressed in the mold by means of a plunger. When the mold is opened and the article is removed therefrom, it becomes necessary to polish the surface of the tumbler in order to remove the marks of the mold from the glass and to impart a polish thereto. Heretofore this has generally been done by hand, although the operation has, more or less imperfectly, been carried on by the use of apparatus designed for that purpose.

The purpose of my invention is to fire finish and polish the tumblers or other articles of glassware by means of the apparatus herein-after described and by a single operation.

I shall now describe my invention, so that others skilled in the art may manufacture and use the same.

In the drawings, 1 represents an upright shaft mounted in journal boxes or bearings 2 and 3, the upper bearing 2 being supported on an arm 4, (shown in Figs. 2 and 5,) which arm is bolted to the main frame 5, secured in the brickwork of the furnace. The lower journal or step 3 is secured to the base-plate 6. Firmly secured to the shaft 1 is a gear

and friction wheel 7. The outer top edge of the rim of the wheel 7 is in the form in cross-section of an inverted V 8', the sides of which are at an angle of about sixty degrees, and the lower outer edge of the rim of the wheel is provided with a V-shaped groove 8². At the middle of the periphery of the wheel 7 are formed gear-teeth 7', which occupy only a narrow line on the periphery of the wheel. Supported by the upper V-shaped annulus 8' of the wheel 7 is a series of punty-holding frames 8, one of which is shown in detail in Fig. 3. It is purposed to employ fifteen of these frames in each apparatus, although I do not desire to limit myself to any special number. These frames are each composed of a tube 9, which is loosely supported in brackets 9' 9' of the frame 8 by the two collars 10 10, secured by set-screws to the tube 9. This arrangement permits the tubes 9 to revolve freely in the frames 8. At or about the middle of the tube 9, on the outer circumference of the same, is secured a small gear-wheel or pinion 11, which is arranged to mesh with the teeth 7' on the periphery of the wheel 7. This pinion 11 may be held in place on the tube 9 by means of suitable set-screws. The rear portion of the frame 8 is cut away to permit the pinion 11 to project through the same and engage with the gear-teeth 7'. A steel punty-rod or spindle 12 is inserted through the hollow of the tube 9 in such a manner that it may revolve freely within the tube 9; but it is normally held firmly in the tube by means of a clutch 13, which consists of a collar secured to the punty-rod 12 by a set-screw and having a clutch on its upper surface adapted to engage with a clutch-surface on the bottom of the tube 9. These two parts of the clutch are normally held in contact with each other by means of a spiral spring 14, resting on the top of the tube 9 and held in position by a collar and set-screw 15, secured to the punty-rod above the frame 8. The tension of this spring 14 draws the punty-rod up, and the clutch-collar engages with the tube 9. On top of the punty-rod 12 is placed a form or holder 16', on which the tumbler or piece of glassware is placed. This holder may be of any suitable shape and size adapted to hold the article of glassware to be finished. In the drawings I

have shown it adapted to be used with tumblers, and in practice it should be made about one-eighth of an inch shorter than the tumbler or article to be finished, as I have discovered that the flame or heat, when the holder is so formed, will follow up on the inside of the article and fire-polish it, whereas if the holder extends below the tumbler or article this will not be accomplished to the same extent.

At the rear of the frame 8, at the upper part of the frame, are mounted two rollers 16, having V-shaped grooves in their peripheries adapted to fit over the inverted-V-shaped annulus 8' of the wheel 7. On the lower part of the frame 8 is mounted a single roller 17, fitting in the V-shaped groove 8² in the lower edge of the wheel 7. The roller 16 is provided with means of adjustment to insure the holding of the frame in an upright position. These rollers 16 and 17 permit the frame 8 to travel freely on the periphery of the wheel 7 or to be carried with it, as the case may be—that is, by means of the arrangement described—when the large wheel 7 revolves, and the punty-rod frames 8 are carried with it in a circle; but as soon as the frame 8 is stopped in its movement with the periphery of the wheel 7, the wheel 7 continuing to revolve, the punty-rod 12 and tube 9 are caused to revolve on their axes by means of the pinion 11, with which the gear-teeth 7' of the wheel 7 mesh, and thereby a rotary movement is imparted to the holder 16' on top of the punty-rod.

Motion is communicated to the entire apparatus by a motor 18, bolted to the base-plate 6. The main shaft is driven from this motor by a worm 19, worm-wheel 20, pinion 21, and large spur gear-wheel 22. By this system of gearing the high rate of speed of the motor is reduced to the low speed of two revolutions a minute for the main shaft 1.

Situate adjacent to the main shaft 1 is a furnace or glory-hole A, having an inlet-port F and an outlet-port E and open at the bottom to permit of the passage of the punty-rods. This glory-hole is provided with a gas or fire flue G and a chamber K, one or more flues C opening from the flue G into the chamber K at or near the central part of the same. Although I have chosen this form of glory-hole, I do not desire to limit myself thereto, as various other forms of chambers and gas-burners may be substituted for the form which I have shown.

In the operation of my apparatus it is designed that the punty-rods 12 shall be caused to pass through the segmental chamber K and when they reach the point or points where the flue or flues C open into this chamber that the punty-rods shall be stopped in their forward movement through the chamber and a rotary movement be imparted to the holder so long as it remains at rest in front of the glory-hole, and, further, that when the punty-rod is released and permitted to resume its forward movement through the chamber the

rotary movement is stopped and the punty-rod is caused to travel until it passes out of the chamber and is brought in front of a stand, where it is adapted to be again stopped in its forward movement and to have a more rapid rotary movement imparted to it than the movement imparted to it in front of the glory-hole and to have a finishing-cup placed over the article while it is being so rotated and then to be again released and permitted to proceed to the starting-point, the finished tumbler being removed as soon as finished and an unfinished tumbler placed on the holder.

In order to automatically stop the punty-holding frames 8 in their forward movement and to start and stop the rotary movement of the punty-rods, I employ turnstiles 36 at the three stations M N O and two magnets 39 and 32, each in circuit with the battery X, the first magnet 39 at the second station N being adapted to release the frame 8 from the turnstile by means of an armature 40 at the bottom of the turnstile-rod 34, the magnet drawing down the armature and with it the rod, and the second magnet 32 at the third station O being adapted to draw down the punty-rod 12 by means of an armature 12', placed on the bottom of the rod, releasing the clutch 13 from the tube 9 and bringing the armature 12' into contact with the magnet 32, so that it shall rotate with the same.

Motion is transmitted to the magnet 32, which is mounted on bearings bolted to the base-plate 6, by gear-wheel 22, pinion 23, gear-wheel 24, pinion 25, gear-wheel 26, pinion 27, and miter-gears 28, 29, 30, and 31, the miter-gear 31 being secured to the spindle of the magnet 32. This gearing imparts to the magnet 32 a speed of about four hundred and eighty revolutions per minute, the magnet continuing to revolve all the time the machine is in motion.

Each of the turnstiles 36, which control the movement of the punty-holding frames 8, is constructed as follows: In front of the machine, to the left of the center line, is placed an upright post or shaft 33, which may be firmly bolted to the base of the machine. About half-way up this shaft 33 is secured a plate 37, and to the top of the shaft is secured another plate 35. Passing through holes in these plates 35 and 37 is a rod 34, which rod at stations M and O has a foot-rest or step 34' at its lower end, as shown in Fig. 1. A spiral spring 38 causes the rod 34 to project a short distance above the plate 35. To the top of the plate 35 is pivoted the four-arm turnstile 36.

At or about the center of the furnace or glory-hole A is a recess or opening in the brickwork, in which is placed a frame and turnstile similar to the one just described, with the exception that the rod 34, which controls the turnstile, when it is desired to release the frames, is depressed by means of the magnet 39, as shown in Figs. 1 and 5. When the frames 8, passing through the cham-

ber K, reach the glory-hole at the mouth of the flue or flues C, they each strike the arm of the turnstile 36 at station N and are held from further travel with the periphery of the wheel 7. At the same time by means of the gear-teeth 7' on the periphery of the wheel 7, meshing with the pinion 11, the tube 9 is caused to revolve, and thereby the punty-rod and holder, with the tumbler, are caused to rotate at a rate of about forty-eight revolutions per minute, the tumbler being directly in the glory-hole. The tumbler is kept in position in the glory-hole by the turnstile until it is thoroughly fire-finished.

The general operation of the apparatus is as follows: The glory-hole having been heated to the required temperature, the motor, which communicates motion to the entire machine, is set in motion. The pressed tumbler or other article of glassware is then taken by the carrying-over boy and placed on the holder 16' at the first station M. The rod 34 is then depressed by the foot of the carrying-over boy, which permits the turnstile 36 to revolve and the punty-rod and the holder with the tumbler to be carried by the action of the large gear-wheel 7 into the heat of the glory-hole, where the punty-holding frame comes in contact with the second turnstile 36 at station N. The frame striking the turnstile comes to rest, whereupon the tumbler is caused to revolve in the manner already described. After placing the tumbler on the holder 16', as just described, and starting it toward the glory-hole the carrying-over boy returns to the press, gets a second tumbler and takes it to the finishing-machine, and repeats the operation, starting a second punty-holding frame to the glory-hole. When the second punty-holding frame arrives at and strikes the first holder at station N, it also comes to rest and the second tumbler commences to revolve in the heat of the glory-hole in the same manner as does the first one. This operation is repeated with the third tumbler. When these three tumblers are revolving in the heat of the glory-hole, the finishing boy, or the one who stands at the third station O, where the second magnet 32 is located, energizes the magnet 39 at the station N by making connection between the spring contact-points 41 and 42, mounted on a post 43, by means of a piece of copper wire or otherwise, when the magnet 39 will draw down the rod 34, as already described, and permit the turnstile 36 to turn and the first punty-holding frame with the heated tumbler to pass with the wheel 7 along the chamber K to the third station O, where it encounters the turnstile 36 at that station and is brought to rest. Here the attraction of the magnet 32, brought into circuit by contact of the frame 8 with the contact-points 41 and 42, draws down the punty-rod and releases the clutch 13 of the tube 9. At the same time the plate 12' of the punty-rod is drawn down and held in contact with the magnet 32 and is caused to revolve

therewith at the rate of about four hundred and eighty revolutions per minute. At the instant the heated tumbler begins to revolve with the magnet the finishing-boy takes the finishing-cup 50, (shown in Fig. 4,) depresses the spring 51, attached to the handle of the cup, whereby free access is allowed for the tumbler into the cup, places the cup over the heated tumbler, and holds the cup stationary. The inside bottom 52 of the cup is pivoted to a bracket 53, which is secured to the outside of the cup, as shown in Fig. 4, so that when the bottom rests on the tumbler it will revolve with the tumbler while the main body of the cup remains stationary. The heated tumbler revolving rapidly is thrown outwardly by centrifugal force against the sides of the cup, which gives it its finish, shape, size, and surface. As soon as the tumbler is finished the boy deenergizes the magnet 32 by means of the switch Z, which releases the armature 12' from the magnet, lifts the article from the holder 16' by the cup, and drops it into a box of sand, and then by depressing the step 34' with his foot releases the frame 8 from the turnstile and the frame travels on to the station M.

It is only necessary to make electrical connection between the brass clips or contact-points 41 and 42 for the first tumbler, because when the first frame 8 passes to the revolving magnet 32 it touches said clips and makes the connection between the same, which releases the second frame 8 at station N and allows it to travel slowly to the station O while the first tumbler is being finished. As soon as the first tumbler is removed the finishing-boy depresses the turnstile-rod at station O and the frame 8 travels forward to its original position at station M. This operation is repeated as often as desired.

D is an air-blast for cooling the holders 16' coming from the station O, so as to put them in condition to receive the tumblers to be finished.

The great advantages of my improvement will be readily apparent to those skilled in the art. By means of it I am able to fire-finish pressed tumblers and other articles of glassware at one operation without the use of the ordinary punty-rod, which in hand-finishing is secured to the base of the tumbler and is the cause of marring the same, so that several grinding operations are required to restore it to its original condition. It prevents the breakage incident to careless handling and insecure attachment of the punty-rod, and it dispenses with the use of a skilled finisher and two sticking-up boys. Not only is the cost of the operation greatly lessened and the loss incident to the ordinary methods almost eliminated, but the number of tumblers which can be finished by means of my improvement is very much in excess of what can be done by the ordinary methods heretofore in use.

Although I have described certain specific

mechanisms for imparting and controlling the movements of the parts of the apparatus, I do not desire to limit myself thereto.

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

1. In apparatus for fire-polishing and fire-finishing glassware, the combination of a rotatory carrying-wheel, a punty-rod adapted to be carried by the wheel, a glory-hole, a device for arresting the travel of the punty-rod with the wheel, and device for imparting a rotatory movement to the rod when so arrested.

2. In apparatus for fire-polishing and fire-finishing glassware, the combination of a rotatory carrying-wheel having gear-teeth, a punty-rod frame adapted to be carried by the carrying-wheel and having gear-teeth meshing with the teeth of the carrying-wheel, a glory-hole, and a device for arresting the movement of the punty-rod frame with the carrying-wheel.

3. In apparatus for fire-polishing and fire-finishing glassware, the combination of a rotatory carrying-wheel, a series of punty-rod-holding frames loosely supported on the carrying-wheel independently of each other, and devices for arresting the movement of the frames with the wheel.

4. In apparatus for fire-polishing and fire-finishing glassware, the combination of a carrying-wheel having gear-teeth, a punty-rod carrier consisting of a frame mounted loosely on the carrying-wheel, a tube mounted in the frame and having gear-teeth which mesh with the teeth of the carrying-wheel, a punty-rod mounted loosely in the tube, and a clutch and device for throwing the punty-rod in and out of connection and rotation with the tube, substantially as specified.

5. In apparatus for fire-polishing and fire-finishing glassware, the combination of a carrying-wheel having gear-teeth, a punty-rod frame loosely mounted on the wheel and having gear-teeth which mesh with the teeth of the wheel, a punty-rod loosely mounted in the punty-rod frame, a clutch for connecting the punty-rod to the frame, a rotatory motor, and devices for disconnecting the parts of the clutch and connecting the punty-rod with the rotatory motor.

6. In apparatus for fire-polishing and fire-finishing glassware, the combination of a carrying-wheel, a series of punty-holding frames

loosely mounted thereon, a glory-hole, and a turnstile for arresting the movement of the punty-holding frame, and devices for locking and unlocking the turnstile.

7. In apparatus for fire-polishing and fire-finishing glassware, the combination of a carrying-wheel, a series of punty-holding frames loosely mounted on the carrying-wheel, a glory-hole, an arresting device for arresting the travel of the frames at the glory-hole, a releasing device, a finishing-stand having an arresting device and a rotatory motor, and devices for bringing the punty-rods in connection with the motor.

8. In apparatus for fire-polishing and fire-finishing glassware, the combination of a carrying-wheel, a series of punty-holding frames loosely mounted thereon, an inclosed passage having a glory-hole as a part of the same, a device for arresting the punty-holding frames at the glory-hole, a finishing-stand and a device for automatically releasing one of the frames from the glory-hole station by the passage of a frame to the finishing-station, substantially as specified.

9. In apparatus for fire-polishing glassware, a carrying device connected with a driving-motor, punty-rods mounted on said carrier and means for imparting a rotatory movement to the rods, a glory-hole, three stops so placed as to stop the travel of the punty-rods at three points or stations, which are the stations where the glass article is placed on the form of the punty-rod, the station in the glory-hole, and the station where the article is finished, substantially as specified.

10. In apparatus for fire-polishing glassware, a carrier, a series of punty-holders mounted loosely on the carrier, devices for imparting a rotatory movement to the punty, a glory-hole, a stop at the glory-hole adapted to arrest the movement of the punty-holder, a magnet for releasing the punty-holder from the stop, a finishing-station having a stop and motor and a device for releasing the punty from its first rotatory connection and connecting it with the finishing-motor, substantially as specified.

In testimony whereof I have hereunto set my hand.

FRANK WOODRUFF.

Witnesses:

WM. H. BLACK,

CHAS. S. SHALLENBERGER.