

No. 765,119.

PATENTED JULY 12, 1904.

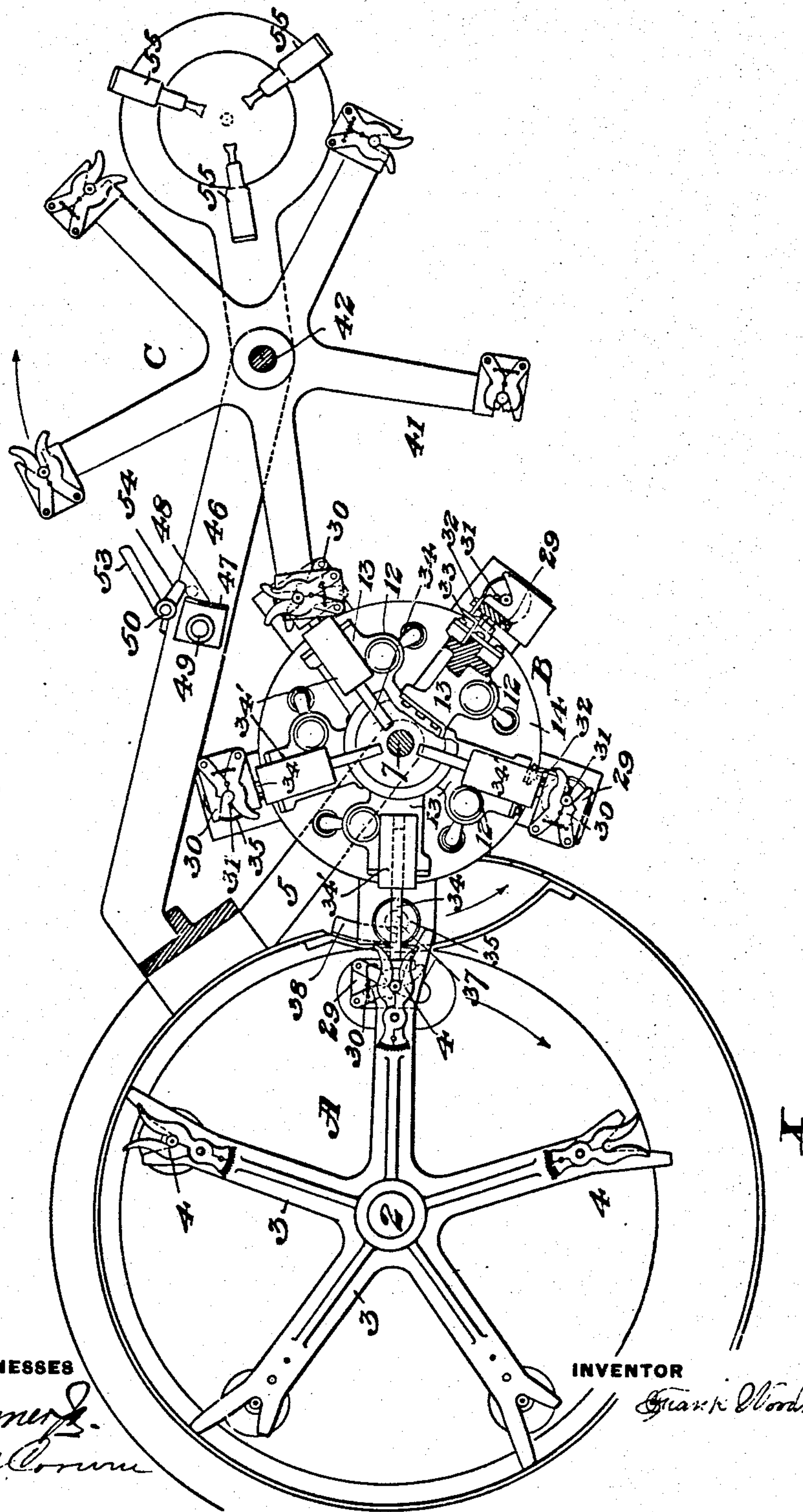
F. WOODRUFF.
GLASS FINISHING APPARATUS.

APPLICATION FILED NOV. 14, 1900.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

L. A. Comer.
H. W. Comer.

INVENTOR

Frank Woodruff.

No. 765,119.

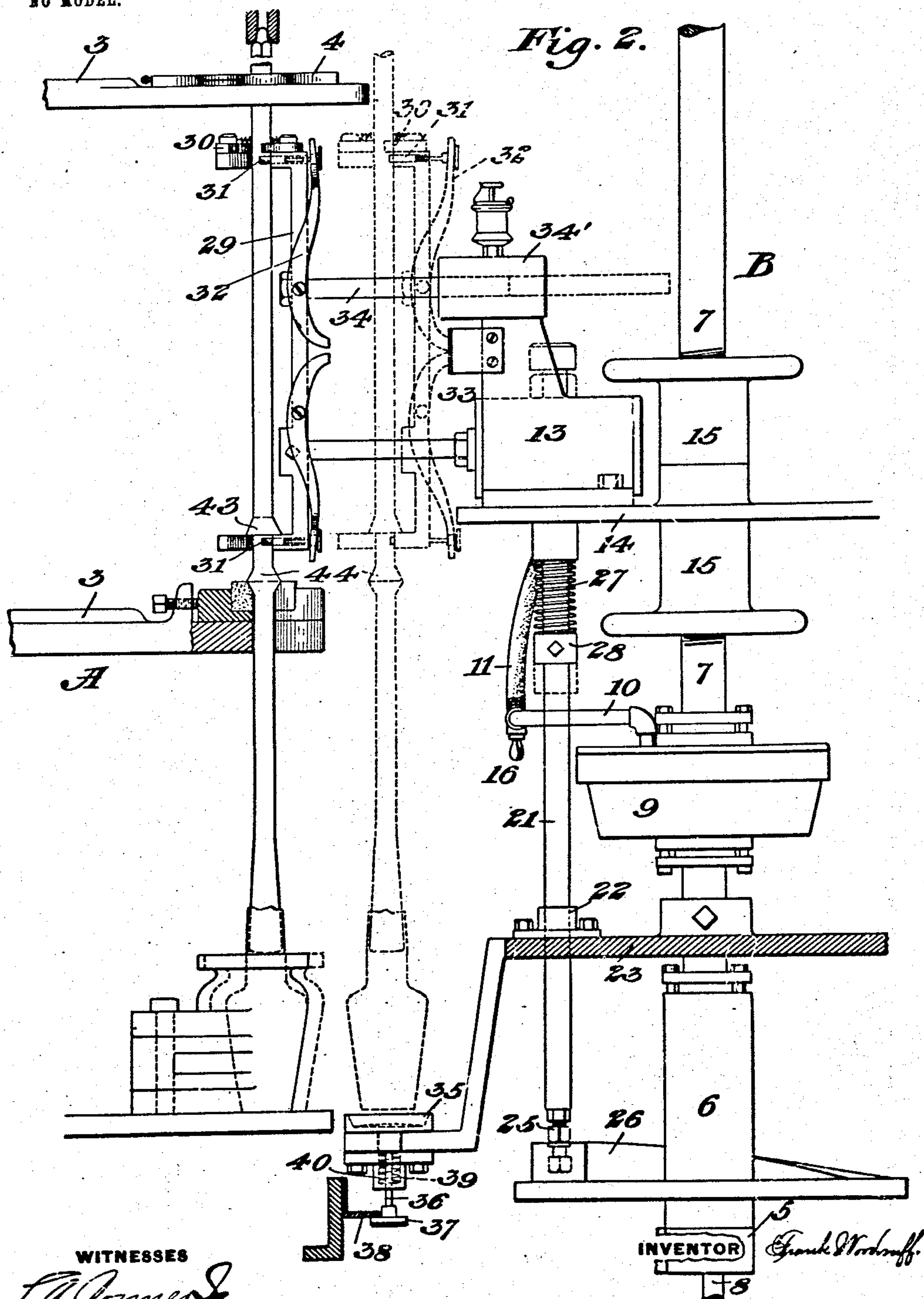
PATENTED JULY 12, 1904.

F. WOODRUFF.
GLASS FINISHING APPARATUS.

APPLICATION FILED NOV. 14, 1900.

NO MODEL.

4 SHEETS—SHEET 2.



WITNESSES

L. A. Comer
J. M. Corwin

INVENTOR

Frank Woodruff.

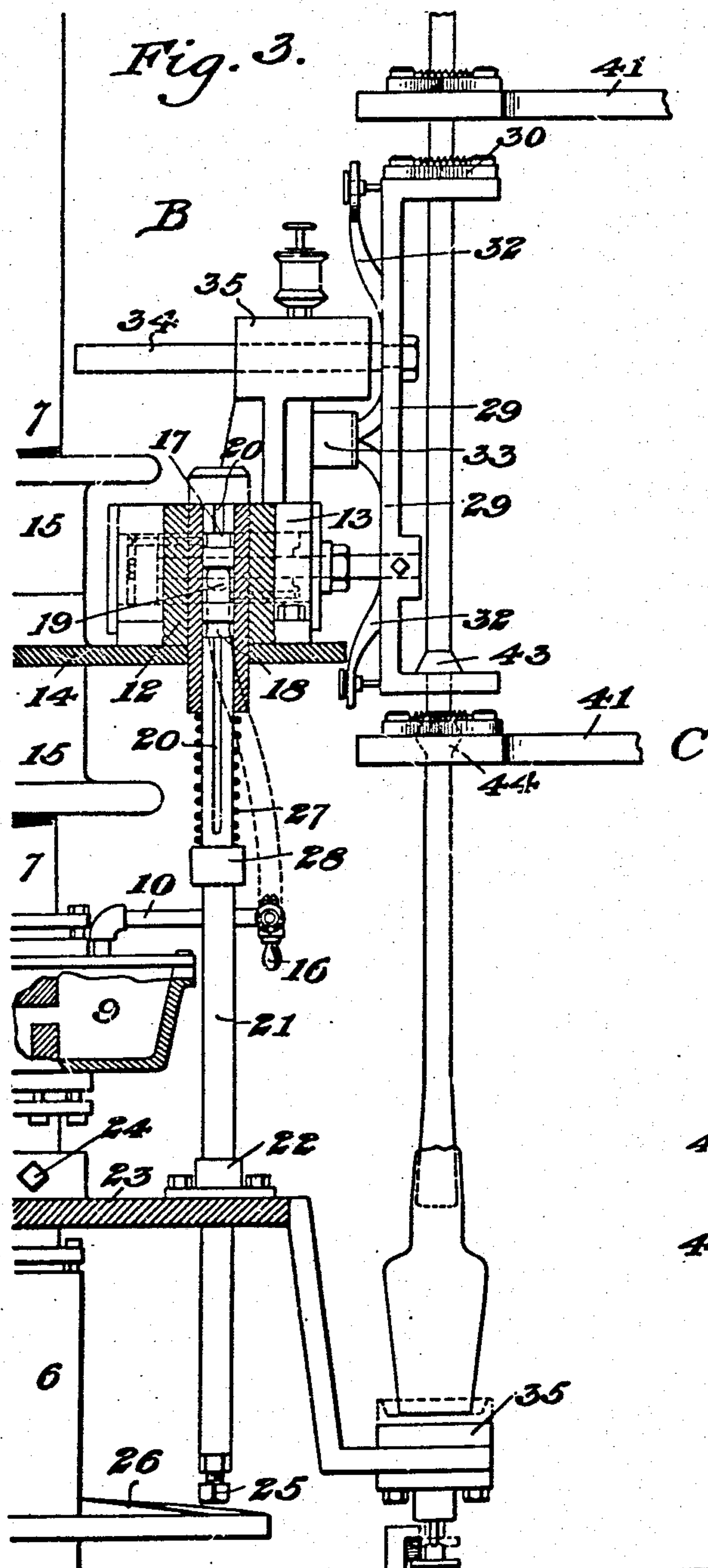
No. 765,119.

PATENTED JULY 12, 1904.

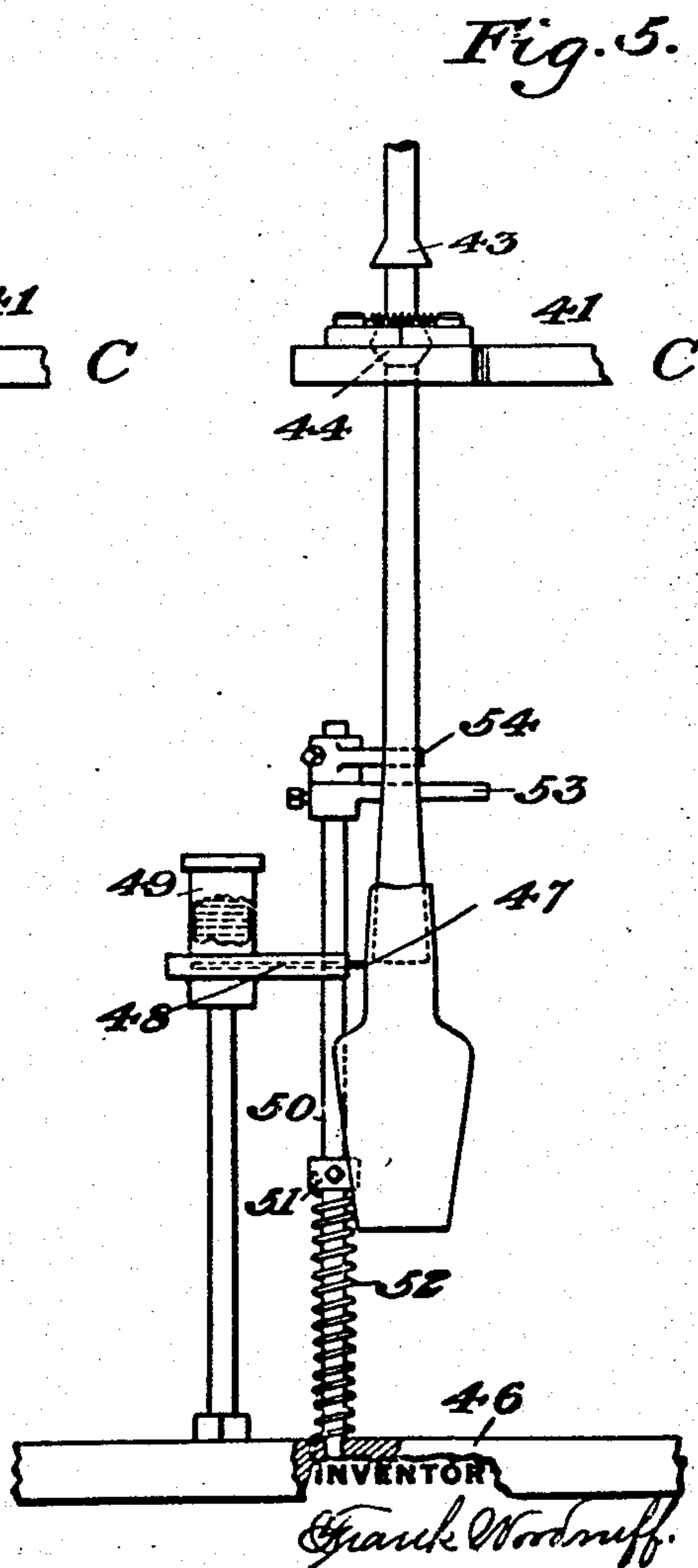
F. WOODRUFF.
GLASS FINISHING APPARATUS.
APPLICATION FILED NOV. 14, 1900.

NO MODEL.

4 SHEETS—SHEET 3.



WITNESSES
L. A. Conner
H. M. Conner



INVENTOR
Frank Woodruff

No. 765,119.

PATENTED JULY 12, 1904.

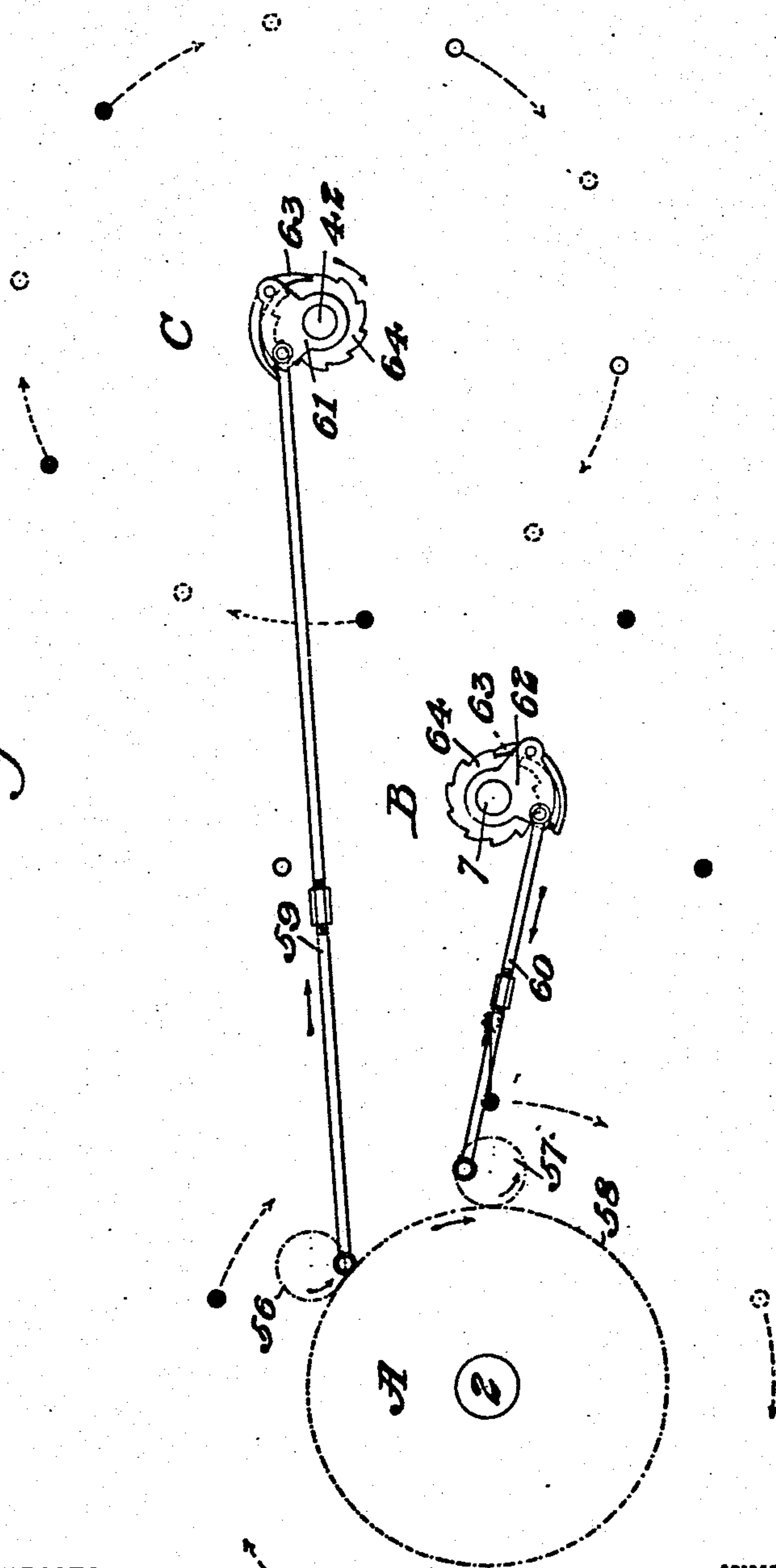
F. WOODRUFF.
GLASS FINISHING APPARATUS.

APPLICATION FILED NOV. 14, 1900.

NO MODEL.

4 SHEETS—SHEET 4.

Fig. 4.



WITNESSES

L. A. Ames.
S. M. Brown.

INVENTOR

Frank Woodruff.

UNITED STATES PATENT OFFICE.

FRANK WOODRUFF, OF ROCHESTER, PENNSYLVANIA.

GLASS-FINISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 765,119, dated July 12, 1904.

Application filed November 14, 1900. Serial No. 36,489. (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 Glass-Finishing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a plan view, partly broken away, showing my improved apparatus in connection with an automatic blowing-machine. Fig. 2 is a side elevation, partly broken away, showing the taking-out devices in connection with a part of the automatic blowing-machine. 15 Fig. 3 is a similar view showing a part of the taking-out devices and a portion of the cracking-off apparatus. Fig. 4 is a diagrammatic plan view of the apparatus, showing the connections for driving the two rotary carriers; and Fig. 5 is an enlarged side elevation showing the automatic cracking-off mechanism.

My invention relates to the manufacture of hollow articles of glassware, and more particularly to the finishing of articles blown in an automatic blowing-machine of the Owens type and to other steps connected with the operation of such or other machines. Heretofore in using machines of this character the blow- 30 pipe, with the blown article upon it, is removed by the skilled operator from the automatic blowing-machine and the bottom of the hollow article is "set up," the central portion of the bottom being forced up to give the desired 35 shape. The article is then cooled somewhat, and another operator separates the article from the blowpipe, and the pipe, with the refuse glass upon it, is then taken by another operator and the glass removed therefrom by 40 hand. The blowpipe is then ready for reuse. These operations require the services of four operators for one shop, and the quality of the product depends largely upon the skill and care of these workmen. My invention is de- 45 signed to provide apparatus which will carry out these several steps automatically, thus doing away with hand labor and cheapening and increasing the output and improving the facility of operations.

The invention therefore consists in devices 50 for automatically removing the articles from a blowing-machine, in devices for automatically setting up the bottoms of the article, in apparatus for automatically cracking off the article from the pipe, and in mechanism for 55 automatically removing the surplus glass left upon the blowpipe.

It further consists in the various combinations and arrangements of parts, as herein- 60 after more fully described, and set forth in the claims.

In the drawings, A represents an automatic blowing-machine of the well-known Owens type, B my automatic taking-off and setting- 65 up device, and C my automatic cracking-off and pipe-cleaning apparatus. Each of these contains a rotary carrier by which the pipes are supported, the machine A being continuously driven at slow speed, while device B and apparatus C are rotated intermittently, 70 the apparatus C being moved while device B is at rest, and vice versa.

I show the blowing-machine as having the usual vertical shaft 2, provided with two five-armed spiders 3 3, having spring-catches 4, 75 which yieldingly retain the blowpipes in vertical position during the revolution of the shaft. The shaft is revolved clockwise, and the operator stands at the point marked X.

A bracket-arm 5 extends laterally from the 80 frame of the blowing-machine and carries the cylindrical bearing 6 for the vertical shaft 7 of the take-off device. This cylindrical bearing is hollow and provided in its bottom with a hardened-steel step for the lower end of the 85 shaft, the step being centrally perforated in registry with a compressed-air-supply pipe 8, leading upwardly through the bracket. The lower portion of the shaft 7 is made hollow with an open lower end and is provided with 90 a lateral hole opening into a surrounding reservoir 9. The upper end of the bearing 6 and both ends of the reservoir are provided with suitable stuffing-boxes, and the air is led from the reservoir through branch pipes 10 95 and flexible hose connections 11 to valve-chambers 12, bored in the side portions of the horizontal motive cylinders 13. These cylin-

ders, which are five in number, are mounted on an adjustable annular plate 14, splined to the shaft 7 and held in its adjusted position by hand-wheels having innerly-screw-threaded hubs 15 engaging suitable screw-threads on the shaft 7, which is or may be solid in this portion. The flexible hose connections allow the vertical adjustment of the motor-carrying table, and the fluid-supply is regulated by suitable valves or gates 16.

The valve-chamber 12 has a cylindrical bore and contains a vertically-moving plunger-valve having two narrow annular ports 17 and 18, with a longer annular port 19 between them. In the sides of this piston-valve beyond the outer ports are cut longitudinal keyways 20, leading from the ports and acting as exhaust-ports when the device is in operation. The stem 21 of each piston-valve extends down through a bearing 22, secured to plate 23, adjustably held to the shaft 7 by set-screws 24, and each stem is provided with an adjustable post 25, arranged to bear upon a camway 26, extending in the arc of a circle about the axis of the shaft 7. Each valve-stem is normally forced downwardly by spiral springs 27, bearing upon the collar 28 of the stem and against the lower end of the valve-chamber.

The piston-rods of the motive cylinders carry vertically-extending supports 29, each of which has at its top and bottom laterally-movable spring-clips 30 with spring-pressed pins 31, which may be opened by curved levers 32, the outer forked ends of which engage heads on the pins, as shown. The inner ends of these levers are arranged to engage a stop 33 when the piston of the motive cylinder is retracted to draw the pipe, with the attached article, from the blowing-machine to the device B. To hold each vertical support 29 and guide it in proper position, I secure to it a radially-extending rod 34, which is guided within a tubular bearing 34', mounted on a bracket on the motive cylinder. In order to set up the base of the article after it is thus automatically taken from the blowing-machine, I provide the plate 23 with five depending arms, on each of which rests a forming-plate 35, which is slightly higher in the center than at the periphery. The stem 36 of this plate extends downwardly through a guiding-hole in the arm, and the plate is held down by a button 37 on the end of the stem, which passes beneath a cam or hold-down guide 38 just before this arm comes into line with the arm of the blowing-machine. A spiral spring 39, held by the depending cap 40, presses upwardly against the larger portion of the stem, and as the article is taken from the blowing-machine the button passing out from under the cam releases the stem, and the spring forces the forming-plate up against the bottom of the article which registers with it, as shown in dotted lines in Fig. 2. This forms or sets up the bottom of the heated article, and as the device B revolves counter-

clockwise the blowpipes, with the articles thereon, are carried around step by step.

The next operation is that of cracking off the article from the blowpipe, and this is done by the apparatus C, which rotates clockwise intermittently and automatically takes the blowpipe, with the formed-up article thereon, from the device B. The supporting-brackets and clips of device B are placed between the planes of the spiders 3 of machine A, as shown in Fig. 2, and the five-armed spiders 41, secured to the vertical shaft 42 of apparatus C, are in planes above and below the clips of device B, as shown in Fig. 3. The blowpipe is supported in device B by an annular projection 43 above the projection 44, which supports the blowpipe in the blowing apparatus, and the lower arm of apparatus C supports the annulus 44, while the spring-clips on both arms 41 hold the pipe in place. The apparatus C is carried on another bracket, 46, projecting from the base of the blowing-machine, and the V-shaped openings of the clips engage the blowpipes of the device B, as shown in Fig. 1 and Fig. 3. As the locking-pins of device B are retracted by the stops when the motive cylinders pull the blowpipe into place and as device B is at rest while apparatus C is moving, the arms of apparatus C withdraw the blowpipe from the clips of device B, as shown in Fig. 1. As the arms of apparatus C move around the circle a dampened wiper 47 presses against the neck of the article, as shown in Fig. 5, so as to wet its heated neck. This wiper consists of a suitable projecting wick which extends through a horizontal chamber 48 and is moistened by liquid-cup 49, which gives a constant supply of the liquid. Beside the wiper is mounted a vertical rock-shaft 50, having secured thereto an adjustable collar 51, to which is secured one end of a spiral spring 52, the other end of which is secured to the bracket which carries the apparatus C. To the upper end of the rock-shaft are secured an arm 53 and a shorter arm 54, the shorter arm extending in front of the longer, as shown in Fig. 1. As the blowpipe passes the wiper it strikes the shorter arm and rocks the shaft, and as it passes the shorter arm the shaft is released and the spiral spring will cause the longer arm to strike the blowpipe with sufficient force to loosen the article and separate it therefrom. The article drops at this point into any suitable receptacle or into a conduit through the floor which leads to the leer, and the blowpipe passes on until it reaches the position shown in dotted lines in Fig. 1, where it is given a series of sharp tapping blows by pneumatic hammers 55, which removes the surplus glass from the pipe. The pipe may then be removed from the clips and is ready to be supplied with hot glass and taken to the blowing-machine for the formation of another article.

In Fig. 4 the black circles and arrows indi-

cate the successive positions of the blowpipe with the glass thereon and show the course of the blowpipe through the apparatus.

To give the apparatus an intermittent motion in opposite directions, I provide small pinions 56 and 57, which mesh with a large toothed wheel 58 upon the blowing-machine. Each of these pinions is provided with a crank-pin, from which pins the adjustable connecting-rods 59 and 60 lead to the pivoted pawl-carriers 61 and 62. These pawl-carriers are pivoted about the shafts of devices B and C and carry pivoted pawls 63, engaging ratchet-wheels 64, secured to the said shafts. The pawl-holders are pivoted to the opposite sides of the two shafts, respectively, so that the shafts are revolved in opposite directions. The small gear-wheels and the large gear-wheels are made in the proportion of five to one, so that the small gears rotate five times to one rotation of the large gear-wheel, and the crank-pins are arranged so that the apparatus C is given motion while device B is stopped, and vice versa.

The operation of the apparatus is as follows: The gatherer takes the blowpipe with a gathering of plastic glass thereon and, having shaped it, places the blowpipe in the blowing-machine at the point marked X. The mold closes about the glass, and the article is formed during the revolution of this machine, and when the arm carrying the blowpipe registers with the arm of device B the blowpipe and article are automatically removed from the blowing device to device B, the valve-stem of the motive cylinder riding up the cam to admit fluid at one end of the cylinder and advance the support to the position shown in full lines in Fig. 2. As the clips of device B engage the pipe the valve-stem reaches the end of the cam and is forced down by the spring, admitting air to the other end of the cylinder and drawing the support and blowpipe back to the position shown in dotted lines in Fig. 2. As device B moves the pipe and article in the circular path the bottom plate 35 is automatically released and forced up against the article to shape it properly. The article then passes around until its support registers with the apparatus C, when the arms of this apparatus pull the pipe from the clips of device B and move the pipe in the circular path of this third apparatus. As the pipe is moved in this path the neck of the tumbler or other article is wetted by the wiper, and the striker then hits the pipe a blow, which separates the tumbler from the pipe and allows it to drop. The arms then carry the pipe to the other side of the apparatus, where the pneumatic hammers strike the glass and remove it from the pipe, thus preparing it for the gatherer.

The advantages of my invention will be apparent to those skilled in the art. The services of four workmen are done away with, the

output is increased, and the quality of the product is better and made more uniform. The apparatus forming my invention carries out the operations of taking the pipe from the blowing-machine, setting up the bottom, and cracking off and removing the surplus glass automatically and with great speed and economy.

The apparatus is especially applicable for use in connection with automatic blowing-machines, but may be used in other connections, such as in hand-blowing, in which case the operator would place the blowpipe, with the article thereon, in the device B, which would not then need the automatic take-off mechanism. The several features of my invention may be used either in conjunction with each other or separately, and I intend to so cover them, and many variations may be made in the form and arrangement of the apparatus without departing from my invention.

I claim—

1. In glass-finishing apparatus, a device arranged to receive a blowpipe with a heated blown-glass article thereon, a set-up device, and mechanism arranged to actuate the same to shape the bottom of the blown article after it has been received by said first-named device; substantially as described.

2. In glass-finishing apparatus, a movable carrier arranged to support a blowpipe and article thereon, and a wiper arranged to contact with the neck portion of the article; substantially as described.

3. In glass-finishing apparatus, a movable carrier arranged to support a blowpipe, a wiper arranged to dampen the neck of the hot article on the blowpipe, and a striker arranged to tap the pipe; substantially as described.

4. The combination of a support for a blowpipe, and a tapping device arranged to remove the surplus glass from the pipe; substantially as described.

5. In glass-finishing apparatus, a blowpipe-support, a wiper arranged to contact with the blown article on the pipe, and a striker arranged to tap the blowpipe to detach the article; substantially as described.

6. In glass-finishing apparatus, a movable carrier arranged to support a blowpipe, a wiper arranged to contact with the article, a striker arranged to tap the blowpipe to detach the blown article from the pipe, and a tapping device arranged to dislodge the surplus glass from the pipe; substantially as described.

7. In glass-finishing apparatus, the combination of a blowing-machine, a rotary carrier adjacent thereto, connections between the blowing-machine and carrier for moving the carrier intermittently, and power mechanism thereon arranged to remove the blowpipe from the blowing-machine; substantially as described.

8. The combination of a blowing-machine,

a movable carrier adjacent thereto, a take-off device on the carrier arranged to remove the blowpipe with the article thereon from the blowing-machine, and an automatic set-up device arranged to shape the bottom of the blown article after it has been removed from the blowing-machine and while retained by the take-off device; substantially as described.

9. A rotary carrier having a plurality of motive cylinders thereon, each of said cylinders being connected to take-off mechanism arranged to remove the blowpipe from the blowing-machine; substantially as described.

10. A rotary carrier having a plurality of take-off devices arranged to seize and remove the blowpipe from a blowing-machine, a motive cylinder for each of said take-off devices, and automatic valve mechanism for each of said cylinders; substantially as described.

11. In glass-finishing apparatus, a blowing-machine, mechanism for moving the same continuously, a take-off device, and connections between the blowing-machine and take-off device arranged to move the latter device intermittently; substantially as described.

12. In glass-finishing apparatus, a rotary carrier having a plurality of blowpipe-supports, a plurality of spring-actuated bottom plates, and a plurality of take-off devices having actuating motive cylinders; substantially as described.

13. In glass-finishing apparatus, an endless carrier having a series of motive cylinders thereon, each of said cylinders having a pipe-carrier secured to the piston-rod; substantially as described.

14. In glass-finishing apparatus, a rotary carrier having a plurality of motive cylinders, a blowpipe-support carried on the piston-rod of each cylinder, and spring-clips mounted on the supports and arranged to engage the blowpipe; substantially as described.

15. The combination of a blowing-machine, of a rotary carrier adjacent thereto, mechanism for moving the same intermittently, a plurality of motive cylinders thereon, each having a pipe-support, clips on the pipe-supports, and a device for opening the clips as the pipe is withdrawn from the blowing-machine; substantially as described.

16. A rotary carrier, mechanism for moving the same intermittently, a plurality of motive cylinders thereon, a pipe-support secured to the movable element of each cylinder, spring-clips on the support, lever mechanism for opening the clips, and a stop arranged to actuate

the lever mechanism when the pipe is moved toward the center of the machine; substantially as described.

17. In glass-finishing apparatus, a vertical shaft, an annular plate secured thereto and vertically adjustable on the shaft, and spring-pressed bottom plates carried by the annular plate; substantially as described.

18. In glass-finishing apparatus, a vertical shaft, an annular plate secured to and rotatable therewith, and adjustable vertically on the shaft, motive cylinders mounted on the plate, and take-off devices connected to the cylinders; substantially as described.

19. In glass-finishing apparatus, a carrier arranged to support a blowpipe, and a crack-off device arranged to feed a small amount of liquid to the neck of the blown article on the blowpipe preparatory to cracking off the article; substantially as described.

20. In glass-finishing apparatus, an endless carrier arranged to support a blowpipe, a spring-actuated rock-shaft having a striker arranged to detach the article from the blowpipe, and an arm on the shaft arranged to contact with the blowpipe to actuate the striker; substantially as described.

21. In glass-finishing apparatus, a take-off device arranged to remove the pipe from a blowing-machine, a crack-off apparatus arranged to take the pipe from the take-off device, and mechanism for actuating the take-off and crack-off devices intermittently; substantially as described.

22. In glass-finishing apparatus, a blowing device, a take-off device arranged to remove the blowpipe from the blowing-machine, and having mechanism for shaping the bottom of the article, another apparatus arranged to remove the blowpipe from the take-off device, and crack-off mechanism in connection with the said apparatus; substantially as described.

23. The combination with a continuously-rotating blowing-machine, of two finishing devices arranged to successively engage the blowpipes and carry them, and mechanism for rotating the said two devices intermittently and alternately in relation with each other; substantially as described.

In testimony whereof I have hereunto set my hand.

FRANK WOODRUFF.

Witnesses:

H. P. HARTLEY,

MARTIN WAGGONER.