(No Model.)

2 Sheets—Sheet 1.

E. CONNOLLY.

MACHINE FOR BOTTOMING VIALS.

No. 263,023. Patented Aug. 22, 1882.

Fig 1*

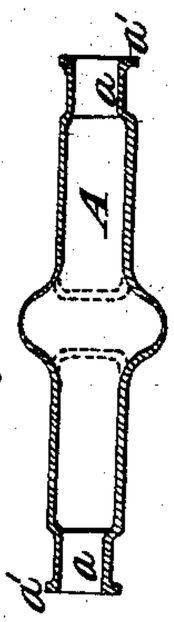

Fig 3.

Fig 1.

Fig 2.

Witnesses

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(No Model.)

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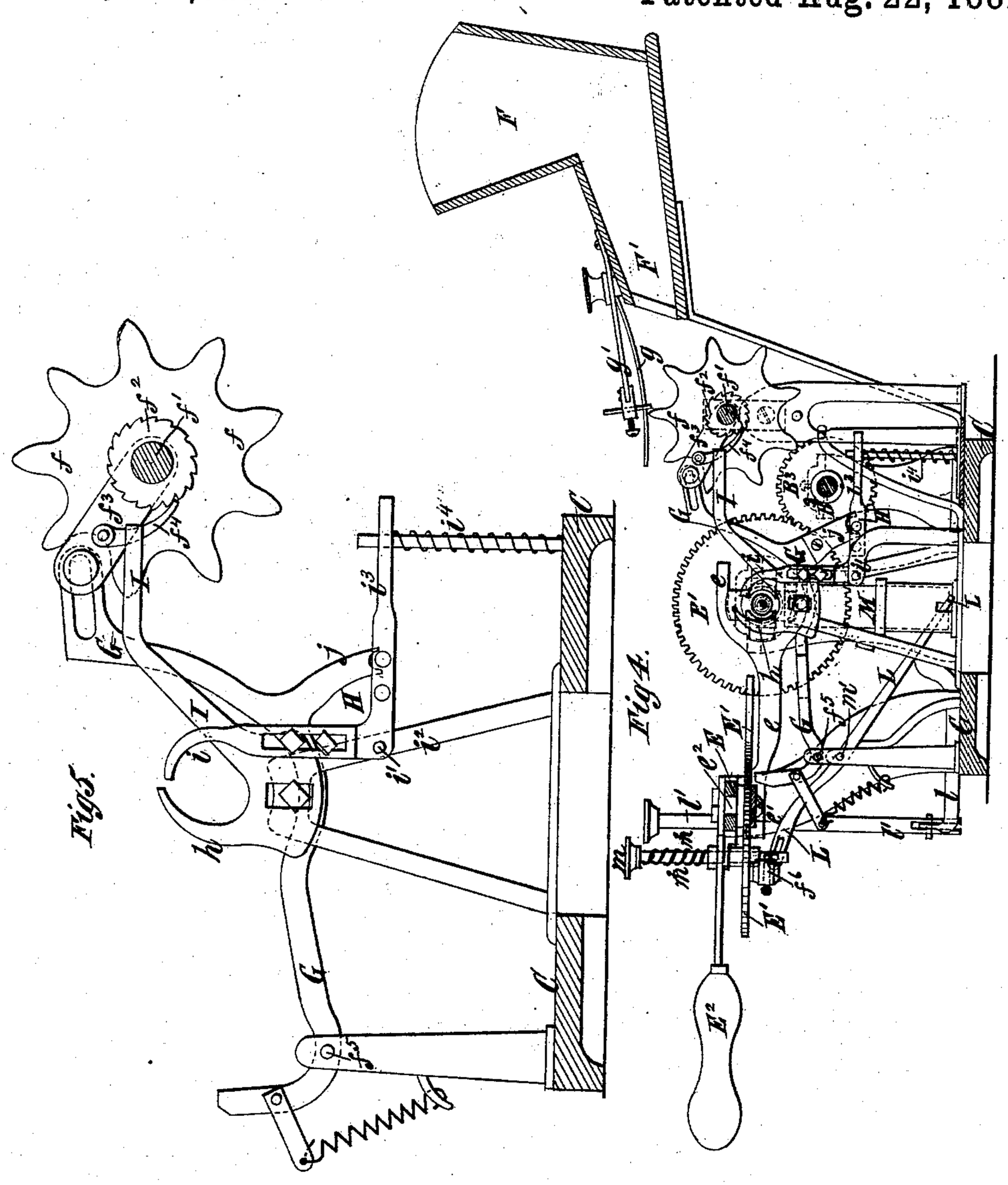

Witnesses
Fred. Haynes
C. L. Sundgren

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UNITED STATES PATENT OFFICE.

EDWARD CONNOLLY, OF HOBOKEN, NEW JERSEY.

MACHINE FOR BOTTOMING VIALS.

SPECIFICATION forming part of Letters Patent No. 263,023, dated August 22, 1882.

Application filed January 31, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CONNOLLY, of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Machines for Bottoming Vials, of which the following is a specification.

In the manufacture of vials such as commonly used for homeopathic medicines it is customary to first form a neck and lip on each end of a glass tube or section of tube of a length to form two vials, and to subsequently divide or "cut off" the tube transversely by the action of a flame, and close the ends formed by the division or cutting off to form the bottoms of or to "bottom" the vials, as it is commonly termed. Heretofore the tubes have been held in the hand while being cut apart by the flame, and then have been bottomed singly; and the object of my invention is to provide for the rotation of the tubes during the cutting apart of the two parts to form the two vials, and the bottoming of the two vials in a more simple and expeditious manner by machinery.

The invention consists essentially in the combination of two rotary spindles arranged in line, and provided with chucks for grasping the two necks of a tube and rotating it, and a burner arranged to cut off the tube at the middle of its length. The spindles are preferably provided with air-passages through them, and carry stoppers for closing the ends of the tube, whereby I provide for maintaining a pressure of air in the tube to bulge or blow it outward when heated.

The invention also consists in the combination, with the spindles and chucks, of mechanism, hereinafter particularly described, for moving the spindles toward and from each other; also, in the combination, with said spindles and chucks, of devices for opening the chucks to release the vials as the spindles are moved away from each other, and for ejecting or expelling the vials from the chucks.

The invention also consists in the combination, with the spindles, chucks, and burner, of a hopper for the tubes, a feeder or feeding device for taking the tubes one by one from the hopper, and holding-jaws or grippers which receive the tubes from the feeder or feeding device, and hold them while the spindles are moved toward each other to effect the engagement of the chucks with the necks of the tube.

The invention also consists in the combination, with the longitudinally-movable spindles and chucks and the burner, of an abutment or plate and means for moving it between the severed portions of the tube, whereby I provide for squaring or finishing the bottoms of the vials by moving the spindles toward each other, so that the bottoms of the vials are pressed against the surfaces of said abutment or plate.

The invention also consists in details of construction and combinations of parts, to be hereinafter described.

In the accompanying drawings, Figure 1 represents a side view of a tube having a neck and lip at each end, and before it is introduced into my machine. Fig. 1* represents a section of the tube after it has been heated and inflated. Fig. 2 represents a side view of one of the two vials formed by cutting off said tube and bottoming the cut-off ends. Fig. 3 represents a plan and partial horizontal section of my machine. Fig. 4 represents a transverse vertical section thereof on the dotted line *x x*, Fig. 3; and Fig. 5 represents a similar view of certain of the parts shown in Fig. 4 upon a larger scale.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to Figs. 1 and 2, A represents the tube, which has a neck, *a*, and a lip, *a'*, at each end, and the same letter, A, designates the vials which are formed by cutting off the tube and bottoming the ends formed by cutting off. The necks *a* and lips *a'* may be formed in any suitable way—as, for instance, in a machine of the kind shown and described in United States Letters Patent No. 220,344, granted to me October 7, 1879.

Turning now to a description of my present machine, (represented in Figs. 3, 4, and 5,) B B designate two spindles arranged in line with each other, and adapted to move longitudinally, and also to rotate in bearings *b*, erected upon a bed-plate, C. The spindles B have fixed upon them gear-wheels B', which engage with and are driven by long pinions B^2 on a driving-shaft, B^3, also mounted in bearings *b'*, erected on the bed-plate C. The shaft B^3 is provided

with fast and loose driving-pulleys B^4 B^5, and by it the two spindles B are rotated in the same direction and at a uniform speed. The pinions B^2 are made long, so that the spindles B and gear-wheels B′ can move longitudinally without moving out of engagement with the pinions. Upon the inner end of each spindle B is a chuck, D, which fits loosely on the spindle, and behind each chuck is a collar, *c*, which is secured upon the spindle by a set-screw or otherwise, and fixed thereon. Each chuck D is connected with its adjacent collar *c* by means of pins *c′*, as shown in Fig. 3, in the chuck on the left-hand spindle, so that the chuck is compelled to turn with the collar *c* and spindle, although it may move longitudinally upon the spindle, independently of the collar. Each spindle B projects slightly through its chuck D, and is capped with a rubber button or washer, c^2, which is adapted to enter the neck *a* of the tube A, and each chuck has two jaws, D′, which are pivoted at c^3, and are hooked at their ends, so as to engage with the lip *a′* on the neck of the tube A. The jaws D′ pass through slots in the collar *c*, and the collar may have set-screws c^4 for setting up the tail end of the jaws and spreading their hooked heads, so as to adapt them for vials having necks of different sizes. In their normal or closed position the jaws D are held against opening by a spring, which may consist of a rubber band, c^5, surrounding the jaws forward of their pivots, as clearly seen in Fig. 3. The chucks D have a slight longitudinal movement on the spindles B until they strike the collars *c*, after which the spindles and chucks move apart together, and the spindles are impelled toward each other by means of springs *d*, arranged on them between one of the bearings *b* and the wheel B′, and exerting a slight pressure, for a purpose hereinafter stated. When the chucks and spindles are moved away from each other they move together until the spindles reach the limit of their outward movement, when the chucks will move still farther independently of the spindles, and the back end of the jaws D′ are pushed into sockets D^2 upon the spindles. The said jaws are inclined at c^6; or the inside of the sockets are tapering, and by such independent movement of the chucks the jaws, being pushed into the sockets, are opened, and the necks of the vials held by them are released.

The sockets D^2 may be rigidly fixed to the adjacent bearings *b;* or they may be loose on the spindles, as here shown, and in such case they will be carried back against the bearings *b* by the longitudinal movement of the spindles.

The spindles B are hollow, as shown clearly in Fig. 3, and are provided at their inner ends with nozzles or jet-tubes *d′*, as seen in Fig. 3. In the outer ends of the spindles B are inserted air-tubes d^2, which pass through stuffing-boxes d^3 to prevent leakage, and these air-tubes are connected by rubber pipes d^4 with a common mouth-piece, d^5, as clearly shown in Fig. 3.

The two chucks D are connected by means of arms *e* with two slides, *e′*, which are adapted to be reciprocated along a horizontal guide way or bar, E, and these slides are operated by means of a cam-plate, E′, pivoted at e^2 to the bar E, and provided with eccentric slots e^3, which receive pins e^4 upon the slides, as clearly seen in Fig. 3. The cam-plate E′ is provided with a handle, E^2, and by swinging this handle horizontally the chucks D and spindles are made to approach and recede from each other.

Turning now to the means for delivering the glass tubes to the machine, F designates a hopper, wherein they are placed, and which has a lateral extending mouth or delivery-outlet, F′, as shown in Fig. 4. In front of the hopper mouth or outlet is arranged a feeder or carrier, which consists of two wheels or disks, *f*, mounted on a shaft, *f′*, and having peripherical notches, each of which is adapted to receive a tube. This feeder or carrier is shown clearly in Figs. 4 and 5. Upon its shaft *f* is a ratchet-wheel, f^2, and a loose lever or arm, f^3, carrying a pawl, f^4, and said lever or arm is connected with one end of a lever, G, which is fulcrumed in a standard at f^5.

Upon the under side of the cam-plate E′ is a projection, f^6, (shown clearly in Fig. 4,) and as the said cam-plate is moved to cause the spindles and chucks to recede from each other said projection comes in contact with the end of the lever G and actuates the same, so as to cause the pawl f^4 to drive the ratchet-wheel f^2 and through it the feeding disks or wheels *f*. By this means the disks or wheels *f* have imparted to them a step-by-step rotary motion, so that their sides which receive the tubes from the hopper always move away from the hopper. Upon the hopper are spring fingers or strips *g*, under which the tubes escape, and which hold the tubes securely in the peripherical notches of the disks or wheels *f* and prevent their escape, and between the fingers *g* is a gage, *g′*, which regulates the delivery of the tubes, and which may be adjusted by a thumb-screw.

Between the spindles B, and in line therewith, are curved fingers or holding-jaws *h*, which are arranged at some distance apart, as shown in Fig. 3, so as to grasp the tubes near their ends. The fingers or holding-jaws may be adjusted in height and position so as to bring their holding-surfaces in proper relation to the spindles B; but after being so adjusted they are securely clamped and remain fixed. Adjacent to the fixed fingers or jaws *h* are movable fingers or jaws *i*, which are attached to or form part of a frame, H, which is fulcrumed at *i′* in a standard, i^2; and i^3 designates an arm extending rearward from said frame, and acted upon by a spring, i^4, to actuate the jaws or fingers *i* to always hold a tube against the fixed finger *h* when the movable fingers or jaws *i* are not actuated to release the tube from the holding-jaws.

Upon the under side of the lever G is a

downward projection, *j*, and when said lever is acted upon to operate the feeding wheels or disks *f* the said projection bears upon the frame H and depresses it against the force of the spring i^4.

I designates inclined guide bars or ways, which extend from the fixed fingers *h* up into proximity to the wheels or disks *f*, and when the frame H is depressed the movable fingers or jaws *i* are moved back behind and beyond the inclined upper surfaces of the guides or ways I, thus allowing a tube to fall from the feeder wheels or disks *f* down along the guides or ways I and against the fixed fingers or jaws *h*. As soon as the lever G rises the frame H is released and the spring i^4 forces it up and closes the movable fingers or jaws *i*, thereby gripping the tube tightly between the fingers or jaws *h* and *i*. When the tube is thus held the cam-plate E′ is operated to draw the spindles together, and the inclined hooked ends of the jaws D′ of the chucks D spring over the lips *a′* at the ends of the tube, and are drawn together by the rubber springs which surround them to grasp the tube by the neck at each end, and thus rotate it. When the tube is thus held it is subjected to the action of the flame issuing from a burner, J, which is of any suitable construction, and which is shown in Fig. 1. While the tube is hot it is inflated by air blown into it through the air-tubes d^2, which cannot escape because of the rubber buttons or washers on the ends of the spindles B, which tightly close the ends of the tube, and by the air-pressure the heated part of the tube is bulged or stretched and thinned, as seen in Fig. 1*. The inflation is then stopped, and the heat and rotary motion being continued, the flame cuts the swelled part, leaving on each section of the tube a portion of the swelled part, which falls in and fuses at the center of the tube, thereby forming bottoms to the vials, as shown in dotted lines in Fig. 1*.

K designates a belt-shipper arranged adjacent to the pulleys B^4 B^5, and *k* designates a spring which always returns the shipper to return the belt to the fast pulley B^4 automatically. The belt-shipper K is operated by a rock-shaft, *l*, (shown clearly in Figs. 3 and 4,) which is itself rocked by a vertical plunger or rod, *l′*, and when the latter is depressed by the hand the belt is shifted onto the loose pulley and the machine is stopped.

Adjacent to the plunger or push-rod *l′* is a second plunger or rod, *m*, which is connected with a lever, L, which is pivoted at *m′*, and the opposite end of which is connected with and serves to raise a vertically-movable abutment or plate, M, (here represented as located below and in the same vertical plane as the spindles B.) The weight of the abutment or plate M serves to return it when raised; but in case that should not be sufficient I may apply a spring, m^2, to the rod or plunger *m* for raising it, as shown in Fig. 4. After the tube is cut off the spindles B are moved slightly apart, thus separating the two severed sections of the tube, and the plunger or rod *m* is depressed to raise the abutment or plate M between the two severed sections of the tube. The plunger or push-rod *l′* is in such close proximity to the plunger or rod *m* that they may both be depressed together, and the belt will thereby be shifted, so as to stop the rotation of the spindles B. The two plungers or push-rods constitute handles for shifting the belt and moving the abutment. The said spindles are then moved toward each other again, and the bottoms of the two vials, while still hot, are pressed tightly upon the opposite smooth faces of the abutment or plate M, and are thereby squared and finished truly. The abutment or plate is then released and drops down out of the way, and the spindles are again rotated.

In lieu of a belt-shifter, I might employ a clutch or other device in the driving mechanism for stopping the rotation of the spindles, and have the plunger or rod *l′* connected with it.

The clamping of the lip *a* of the vial between the hooked heads of the jaws D′ and the end of the spindle B prevents the latter from protruding through the chuck as much as it otherwise would, and hence when the chucks D approach the end of their movement away from each other, and the back or tail ends of their jaws enter the sockets D^2 and release the heads of the jaws from the necks of the vials, the spindles B spring slightly forward relatively to the chucks and eject or expel the vials from the chuck-jaws D′, whereupon they drop into any suitable receptacle.

By my invention I obviate all necessity of holding tubes in the hand while cutting them off and bottoming the vials produced from them, and I enable the tubes to be cut and the vials bottomed very quickly and cheaply. The vials thus bottomed are perfectly square and true at the bottom, and are of superior finish.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with two rotary spindles and chucks arranged in line and adapted to grasp the two necks of a tube and rotate it, of a burner arranged between the spindles and chucks for cutting off the tube, substantially as specified.

2. The combination, with two rotary spindles having air-passages through them and arranged in line, and chucks for grasping the two necks of a tube and rotating it, of air-pipes connected to the spindles, and a burner arranged between the spindles and chucks for cutting off the tubes, substantially as specified.

3. The combination of the hollow spindles B, the chucks D, the air-tubes d^2, stoppers c^2 on the ends of the spindles, and the burner J, substantially as specified.

4. The combination, with the rotary spindles and their chucks for grasping and rotating a tube, and a burner for cutting off the tube, of slides connected with said spindles and chucks, and a cam-lever for moving the spin-

dles and chucks toward and from each other, substantially as specified.

5. The combination, with the rotary spindles, the chucks having jaws for grasping and rotating the two necks of a tube, and a burner for cutting off the tube, of the sockets upon the spindles for releasing said jaws from the necks of the vials as the said spindles are moved away from each other, substantially as specified.

6. The combination, with the rotary spindles and chucks for grasping and rotating the tubes, and a burner for cutting off the tubes, of a hopper from which tubes are fed one by one to the chucks, substantially as specified.

7. The combination, with two rotary spindles and chucks and a hopper, of fingers or holding-jaws for grasping a tube, a burner for cutting off the tubes, and a feeding device for taking tubes one by one from said hopper and delivering them to said holding-jaws, substantially as specified.

8. The combination, with the two rotary spindles and chucks, a burner for cutting off the tubes, and a hopper, of a feeder for taking the tubes one by one from said hopper, and a lever for simultaneously moving said spindles away from each other and operating said feeder, substantially as specified.

9. The combination of the spindles B, chucks D, hopper F, burner J, inclined ways or guides I, fixed jaws *h*, movable jaws *i*, and rotary notched feeding-wheels *f*, substantially as specified.

10. The combination, with the two rotary spindles and chucks movable toward and from each other, and the burner, of the abutment adapted to be moved between the spindles, and chucks for finishing the bottoms of vials while grasped in said chucks, substantially as specified.

11. The combination, with the rotary spindles and chucks, a burner for cutting off tubes, a belt-shipper or device for controlling the rotation of said spindles, and a movable abutment for finishing the bottoms of vials while grasped in said chucks, of handles for moving said abutment between the spindles and for shifting the belt-shifter or device to stop the spindles, arranged in proximity to each other and adapted to be simultaneously operated, substantially as specified.

EDWARD CONNOLLY.

Witnesses:
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