

May 15, 1923.

1,455,056

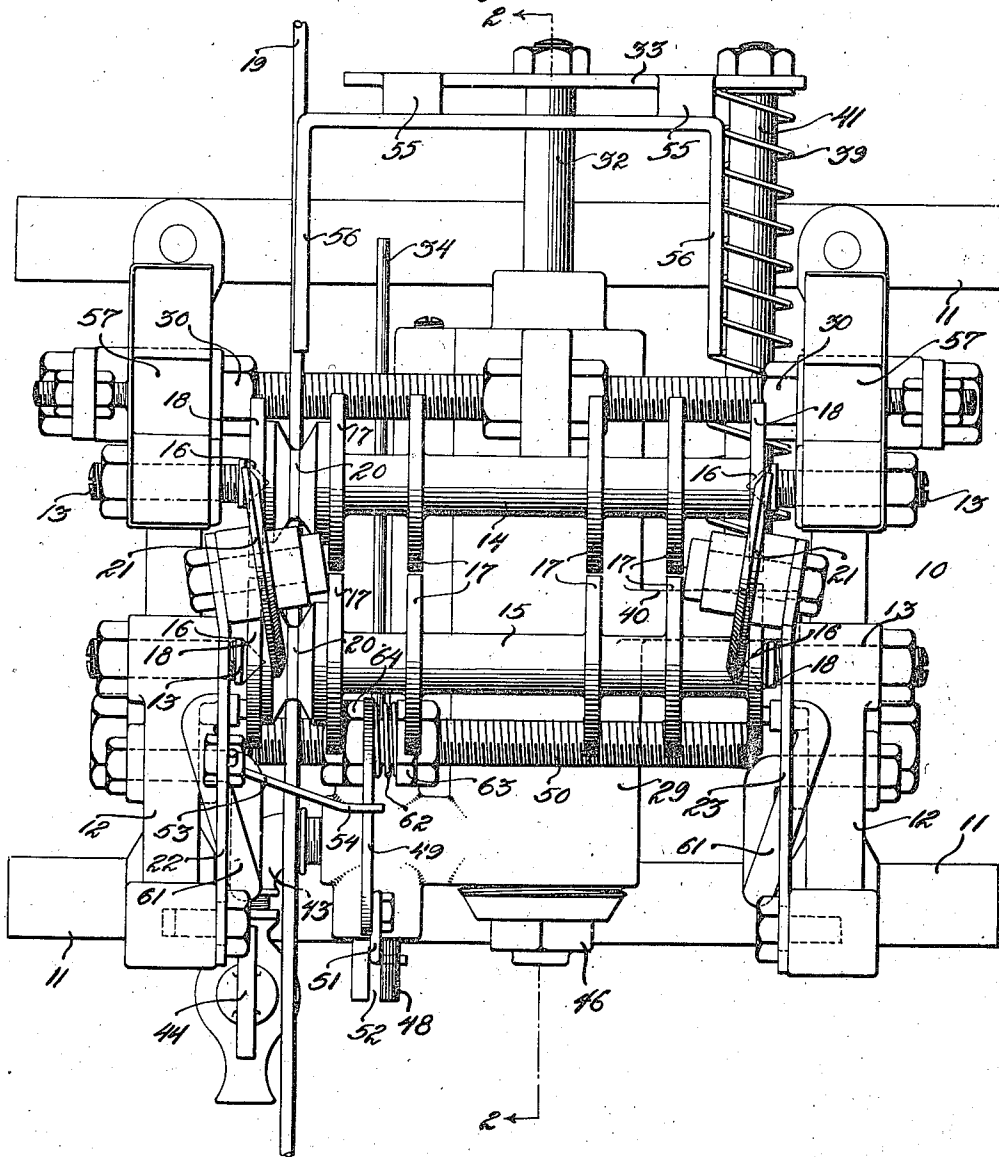
R. KOENIG

VIAL BOTTOMING MACHINE

Filed Oct. 4, 1921

4 Sheets-Sheet 1

Fig. 1.



Witnesses
Geo. A. Gross
Augustus B. Coffey

Inventor
Robert Koenig
By Joshua R. Hottel
his Attorney

May 15, 1923.

1,455,056

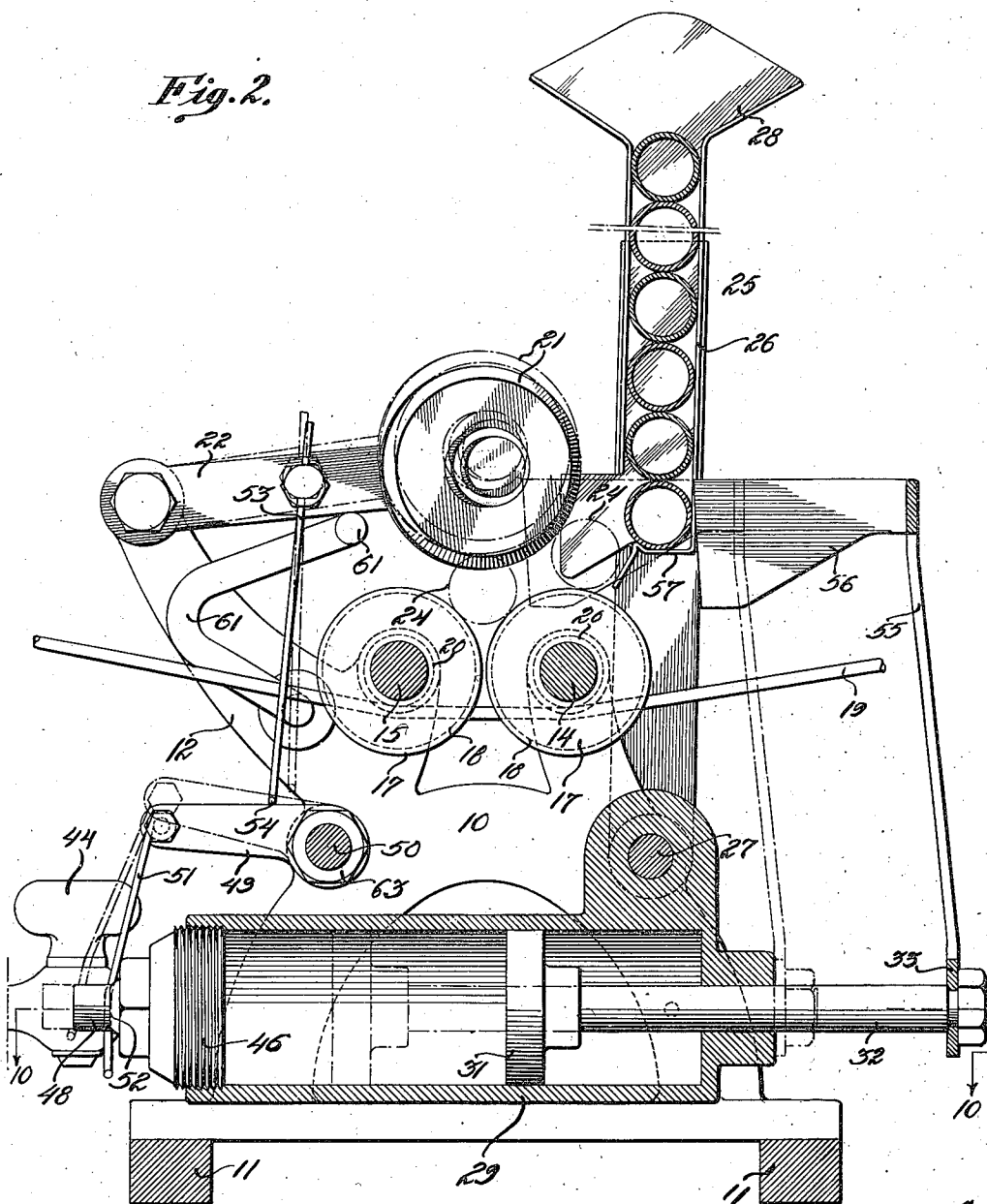
R. KOENIG

VIAL BOTTOMING MACHINE

Filed Oct. 4, 1921

4 Sheets-Sheet 2

Fig. 2.



Witnesses
Geo. A. Gross
Augustus B. Cooper

Inventor
Robert Koenig
By *Joshua R. H. Hottel*
his Attorney

May 15, 1923.

1,455,056

R. KOENIG

VIAL BOTTOMING MACHINE

Filed Oct. 4, 1921

4 Sheets-Sheet 3

Fig. 8.

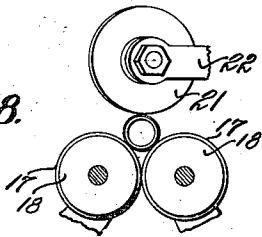


Fig. 9.

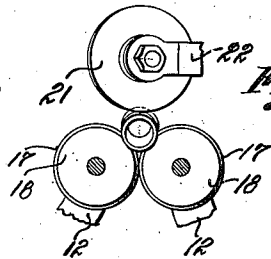


Fig. 3.

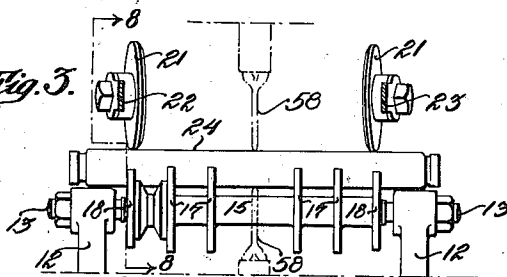


Fig. 4.

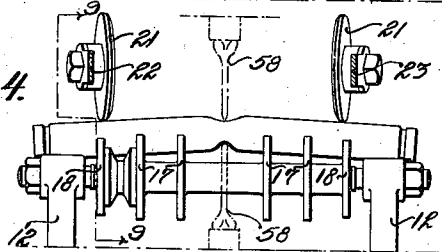


Fig. 5.

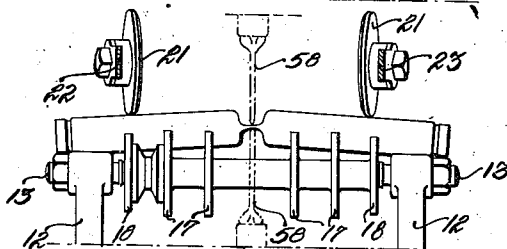


Fig. 6.

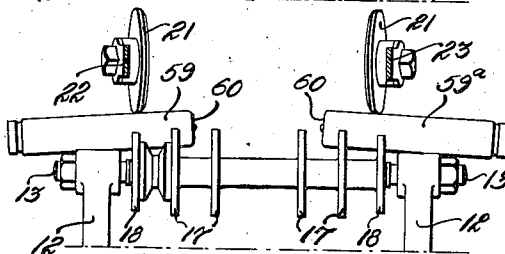
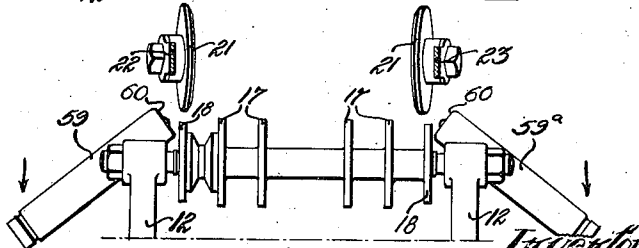


Fig. 7.



Witnesses
Geo. A. Grues
Augustus Blopper

Inventor
Robert Koenig
By Joshua R. Hottel
his Attorney

May 15, 1923.

R. KOENIG

1,455,056

VIAL BOTTOMING MACHINE

Filed Oct. 4, 1921

4 Sheets-Sheet 4

Fig. 10.

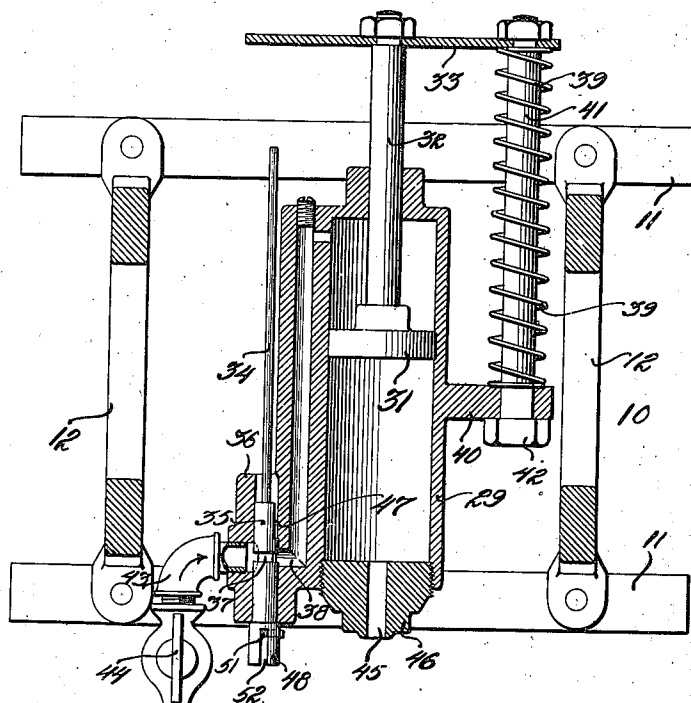
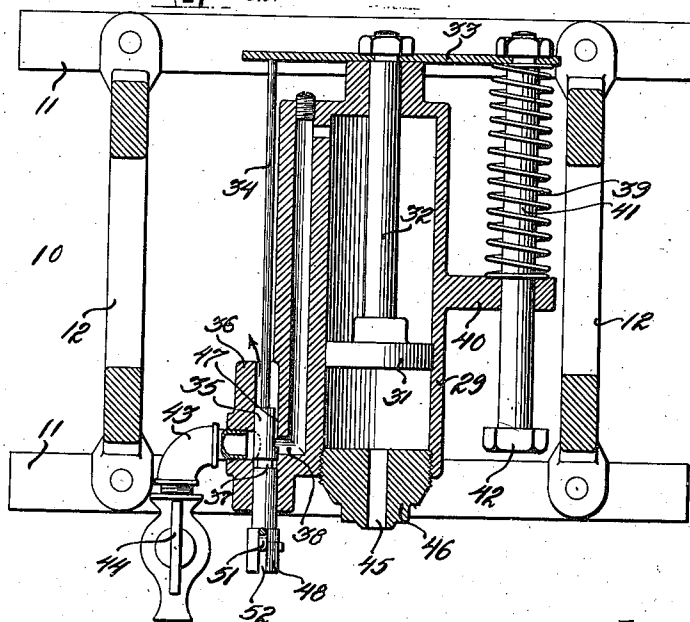


Fig. 11.



Witnesses
Geo. A. Grunt
Augustus B. Coppes

Inventor
Robert Koenig
By Joshua R. H. Hottel
his Attorney

Patented May 15, 1923.

1,455,056

UNITED STATES PATENT OFFICE.

ROBERT KOENIG, OF HADDON HEIGHTS, NEW JERSEY.

VIAL-BOTTOMING MACHINE.

Application filed October 4, 1921. Serial No. 505,424.

To all whom it may concern:

Be it known that I, ROBERT KOENIG, a citizen of the United States, residing at Haddon Heights, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Vial-Bottoming Machines, of which the following is a specification.

One object of my invention is to provide improved means of simple construction which will operate on lengths of glass tubes so as to simultaneously divide each length of tube into parts and close one end of each of the parts so that the latter can be used as vials or bottles.

Another object is to so construct the apparatus of my invention that it will operate to quickly form the bottoms of the vials and so that a great number thereof can be quickly and cheaply produced.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which—

Figure 1 is a top plan view of my improved apparatus; the flame producing means being omitted for clearness of illustration,

Figure 2 is a section taken on the line 2—2 of Figure 1,

Figures 3, 4, 5, 6 and 7 are fragmentary front elevational views illustrating various steps in the action of the apparatus; the flame being illustrated in dot-and-dash lines,

Figure 8 is a section taken on the line 8—8 of Figure 3,

Figure 9 is a section taken on the line 9—9 of Figure 4, and

Figures 10 and 11 are sectional plan views taken on the line 10—10 of Figure 2 drawn on a smaller scale and illustrating the parts in various positions which they assume during the operation of the apparatus.

Referring to the drawings, 10 represents a supporting frame which includes a base illustrated in the form of two rails 11 which are spaced apart and two sides 12 which are spaced apart. The sides 12 have bearing centers 13 for two roller shafts 14 and 15; said centers 13 being in the form of screw threaded members adjustably mounted in the sides 12 and having conical ends 16 which fit in conical recesses in the ends of the shafts 14 and 15 so that the shafts 14 and 15 are freely rotatable but can be easily removed

by backing out the centers 13. The shafts 14 and 15 have rolls or wheels 17 which are preferably arranged in pairs spaced apart within the length of the shafts 14 and 15; said rolls all being of the same diameter and preferably at the same level; the pairs of rolls 17 on one shaft being in respective alignment with the pairs of said rolls on the other shaft as clearly shown in Figure 1.

The shafts 14 and 15 have other rolls 18 adjacent their opposite ends; said rolls 18 being located outside of the confines of the rolls 17. The rolls 18 are preferably all of the same diameter but are of smaller diameters than the rolls 17. The rolls 18 of one of said shafts are in alignment with respective rolls 18 of the other of said shafts as clearly shown in Figure 8. All of the rolls are secured to their respective shafts and if desired can be made integral with the shafts by turning the same out of solid bars of metal. The shafts 14 and 15 are both rotated in the same direction and I have illustrated for this purpose a belt 19 which passes over grooved portions 20 of the shafts 14 and 15; said grooved portions serving as pulleys to permit said rotation of the shafts. Top rolls 21 are rotatably supported on arms 22 and 23; said arms being pivotally mounted on the sides 12 of the frame 10. The rolls 21 are arranged at an angle to each other or in other words these rolls are included in planes diverging rearwardly from a plane extending at right angles to the axes of the roller shafts 14 and 15. These rolls 21 are also located outside of the confines of the rolls 17 and approximately over the rolls 18.

By arranging the rolls 17 as above described they serve as a supporting cradle for lengths of glass tubes, such for example as shown at 24 in Figure 2; the rolls 21 due to their weight and the weight of the arms 22 and 23 serving to hold the tubes against the rolls 17 during the rotation of the shafts 14 and 15 when the tubes are initially fed to the rolls as will be hereinafter described. It may be here stated however that the lengths of tubes to be operated upon are initially fed upon the rolls 17 so that the rolls support the tubes and serve to rotate them while being heated midway between their ends; the action of the rolls 21 then being to supply sufficient weight to cause friction to exist between the tubes and the rolls 17 so that the rotation of said

rolls 17 will effect a rotation of the tubes while being heated between their ends by the flames. It will be noted that during this action the tubes will not touch the rolls 18 for the reason that these rolls are of smaller diameter than the rolls 17 and since the tubes are initially straight there will be no action or function of the rolls 18. However, it will be noted that when the central portion of the glass tubes are softened due to the application of the heat or flames that they will bend due to the weight of the unsoftened portions adjacent the ends and the weight imposed by the rolls 21 and during this action the portions of the tubes at both sides of the central softened portion will be moved into engagement with the rolls 18 and owing to the rotation of the rolls 18, the tubes will be rotated and in view of the angular disposition of the rolls 21 the latter rolls will serve as conveyors to apply tension in opposite directions on the portions of the tubes at both sides of the heated soft portions and the tubes will then be stretched and the glass under the influence of the heat will gradually become of smaller cross sectional diameter until the glass fuses into a solid body and the two end portions of the tube are separated into two parts; the parts having their ends sealed and closed. It will also be noted that when the tube separates the rolls 21 must move downward a certain distance and I utilize this movement of the rolls 21 to effect the feeding of the next tube to the apparatus by mechanism now to be described.

A magazine 25 for the tubes to be fed to the apparatus includes two opposed channel sections 26 which are supported upon the frame 10 preferably by mounting them on a rod 27. The upper ends of these channels are flared to provide hoppers 28 so that the tubes can be readily fed downward with their ends confined within the channels 26. A pressure cylinder 29 is mounted upon the base preferably on the pivot connection 27 for the magazine; it being noted that during the operation of the apparatus there is no pivotal action of the magazine and cylinder relatively to the frame since both the magazine and the cylinder can be clamped in position by nuts 30. The pressure cylinder has a piston 31 therein which is connected to a rod 32; said rod leading out of one end of the cylinder.

An actuating bar 33 is secured to the piston rod 32 outside of the cylinder and at certain times is adapted to engage and move a stem 34 of a valve 35 which is slidably mounted in the cylinder casing 36. The valve 35 has an annular passage 37 adapted at times to register with a passage 38 in the valve casing 36; said passage 37 communicating with the space within the cylinder

to the rear of the piston 31 such for example as shown in Figure 10. A spring 39 is interposed between actuating bar 33 and an integral boss 40 on the cylinder casing 36 and serves under certain conditions to move the piston 31 toward the rear end of the cylinder. This spring 39 is preferably supported on a rod 41; said rod being slidable through the boss 40 and having a head 42 adapted to engage the boss and limit the rear movement of the actuating bar 33.

Pressure fluid, such as air, is conveyed to the interior of the casing 36 by means of a conduit 43 which includes a valve 44; said conduit being capable of being cut off by the valve 35 when the latter is in the position shown in Figure 11 so as to prevent the pressure fluid from entering the passage 38. The interior of the cylinder 29 forward of the piston 31 is in communication with the atmosphere through the medium of a hole 45 in a plug 46 which is screwed into the forward end of the cylinder; said plug merely serving to keep dirt out of the cylinder. The valve 35 to the rear of the passage 37 is preferably reduced in diameter to form a by-pass 47 communicating with the passage 38 when the valve is moved into its forward position as shown in Figure 11 so that any of the pressure fluid within the cylinder to the rear of the piston 31 can escape to the atmosphere and permit the spring 39 to move the piston and actuating bar 33 rearward. The front end of the valve is bifurcated at a position outside of the valve casing as shown at 48. An actuating lever 49 is pivotally mounted on a bar 50 which is supported on the frame 10 and this lever 49 has an extension 51, which may be made in the form of a heavy wire, which extends downward through the space 52 between the furcations of the end 48 of the valve 35.

The actuating bar 33 has an upwardly extending part 55 providing tube-engaging portions 56 which are spaced apart within the width of the frame as clearly shown in Figure 1. These parts 56 during the action are adapted to engage the lowermost tube which is supported in the magazine and push the same off a resilient base 57 which constitutes a portion of the magazine and serves as a support for the lowermost tube. This action of the parts 56 causes the lowermost tube to be pushed into engagement with the upper portions of the rolls 21 so as to effect a lifting movement of the rolls 21 to allow the tube to be moved into the cradle between the rolls 17 on each of the shafts 14 and 15. When the tube assumes a position resting on the rolls 17 of the shafts 14 and 15 the rolls 21 will move downward and hold the tube in said position as previously described and the portions 56 will then move backward into their normal po-

sitions and the next tube in order within the magazine will drop upon the support 57. The action is as follows:

Pressure fluid is admitted into the rear of the cylinder when the parts are in the position as shown in Figure 10 and this action causes the piston to move forward and the portions 56 will engage the lowermost tube within the magazine and push said tube into the position shown at 24 in Figure 2 where it will receive rotation due to the rotation of the shafts 14 and 15 and heat will be applied by oppositely disposed flames as shown in dot-and-dash lines at 58 in Figure 3. The tube will then be rotated while being heated by the flame. During said forward action of the piston 31 the bar 33 will move the valve into the position shown in Figure 1 and the fluid pressure will be cut off and the pressure fluid within the cylinder to the rear of the piston can escape through the medium of the passage 38 and by-pass 47. The spring 39 will then move the actuating bar 33 rearward so as to effect the rear movement of the portions 56 into their normal position. The glass tube will continue to rotate while in a position as shown in Figures 3 and 8 and when the central portion becomes softened the parts of the tube at opposite sides of the softened portion will be tilted due to the weight of the unsoftened glass and also the weight imposed by the rolls 21. This action will allow the rolls 21 to move downward a slight distance so as to hold unsoftened portions of the glass tube in engagement with the rolls 18. This lowering action of the rolls 21 however is not sufficient to permit the rod 53 to actuate the lever 49. This condition of the parts is clearly shown in Figures 4 and 9. During the continued rotation of the shafts 14 and 15 the tube in this bent condition will be rotated and tension in opposite directions will be imparted by the rolls 21 so as to cause the softened portion of the glass to be stretched for example as shown in Figure 5; heat being constantly applied to the glass during the rotation so that the heated portion will become gradually smaller until it fuses or runs into a solid mass finally severing the tubes into two parts 59 and 59^a; the action being to close the ends 60 of said parts 59 and 59^a as shown in Figure 6 so that said parts can be used as vials or bottles. During the continued rotation of the parts 59 and 59^a the rolls 21 serve to move the parts 59 and 59^a in opposite directions until they drop off the opposite sides of the machine. When the parts 59 and 59^a move entirely from under the rolls 21, the rolls 21 will move downward to such extent that the rod 53 will move the lever 49 and the part 51, which extends at a slant, will push the valve 35 rearward and allow pressure fluid to again enter the cyl-

inder 29 to the rear of the piston 31 and the action will be repeated. Figure 7 shows the parts of the tube having been released and the rolls 21 swung downward to effect said movement of the valve. The downward movement of the rolls 21 is limited due to the engagement of the arms 22 and 23 against stops 61 which are secured to the opposite sides of the frame.

As a means for normally holding the actuating lever 49 in its raised position, such for example as shown in dot-and-dash lines in Figure 2, I provide a spring 62 on the bar 50 which bears against the side of the lever 49 and against a nut 62 which is screwed on the bar 50; the opposite side of the lever 49 engaging a nut 64 which is also screwed on the bar 50. Thus I can secure the desired friction against the lever 49 to hold it in its raised position and thereby prevent accidental movement of the lever 49 and valve 35.

In the actual operation of my improved apparatus as above described, I have found that glass tubes can be quickly changed into small vials and that the operation of the mechanism is positive serving as a complete closure for the bottoms and it will be noted that the finishing of the articles effects the movement of the mechanism for feeding another tube in place. If desired the tubes can be shaped at their opposite ends before feeding them into this apparatus so that when finished by my improved apparatus complete bottles or vials will be produced.

By the above construction all of the rolls can be made out of metal and thus avoid the covering of any of the rolls with rubber or any other material which would quickly wear and which would become affected by the heat.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

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

1. Apparatus of the character described including means for heating a tube between its ends; means for rotating said tube; and means for effecting a bending of the tube at the heated portion during rotation; substantially as described.

2. Apparatus of the character described including means for heating a tube between its ends; means for rotating said tube; and means for effecting a bending of the tube at the heated portion during rotation and for applying tension to said tube in opposite

directions at both sides of said heated portion; substantially as described.

3. Apparatus of the character described including rolls for initially supporting a tube while being heated between its ends; and means for applying pressure to said tube at opposite sides of the heated portion while on said rolls whereby said tube will be bent at the heated portion; substantially as described.

4. Apparatus of the character described including rolls for initially supporting a tube while being heated between its ends; means for applying pressure to said tube at opposite sides of the heated portion while on said rolls whereby said tube will be bent at the heated portion; and means for applying tension to said tube in opposite directions at both sides of said heated portion; substantially as described.

5. Apparatus of the character described including rolls for supporting a tube while being heated between its ends; other rolls of different diameter from said first rolls; and means for moving portions of said tube into engagement with said second mentioned rolls during the heating of said tube; substantially as described.

6. Apparatus of the character described including rolls for supporting a tube while being heated between its ends; other rolls of different diameter from said first rolls; and means for moving portions of said tube into engagement with said second mentioned rolls during the heating of said tube and for applying tension in opposite directions to said tube at portions at opposite sides of the heated portion; substantially as described.

7. Apparatus of the character described including rolls for supporting a tube while being heated between its ends; other rolls located outside of the confines of said first rolls and being of smaller diameter than said first rolls so that said tube is normally free of said second rolls; and means for effecting movement of portions of said tube into engagement with said second mentioned rolls when the heated portion of the tube becomes softened; substantially as described.

8. Apparatus of the character described including rolls for supporting a tube while being heated between its ends; other rolls located outside of the confines of said first rolls and being of smaller diameter than said first rolls so that said tube is normally free of said second rolls; and means for effecting movement of portions of said tube into engagement with said second mentioned rolls when the heated portion of the tube becomes softened, said latter means including rolls extending at an angle to the planes of said other rolls; substantially as described.

9. Apparatus of the character described including a magazine for holding tubes to be

operated upon; an operating support; means for moving said tubes from said magazine upon said support; means including a portion adapted to bear upon said tubes when on said support; and means operatively connecting said latter means with said tube moving means and rendered effective, due to the movement of said latter portion upon removal of said tubes from the support, to actuate said tube moving means; substantially as described.

10. Apparatus of the character described including a magazine for holding tubes to be operated upon; an operating support; means for moving said tubes from said magazine upon said support; means including a roll adapted to bear upon said tubes when on said support; and means operatively connecting said latter means with said tube-moving means and rendered effective, due to the movement of said roll upon removal of said tubes from the support, to actuate said tube moving means; substantially as described.

11. Apparatus of the character described including a magazine for holding tubes to be operated upon; an operating support; means for moving said tubes from said magazine upon said support; means including a portion adapted to bear upon said tubes when on said support; and means operative by pressure fluid for actuating said tube-moving means and rendered operative by a movement of said portion due to the movement of said tubes from said support; substantially as described.

12. Apparatus of the character described including a magazine for holding tubes to be operated upon; means for moving said tubes from the magazine; means forming a support for said tubes when moved by said moving means; means operative by fluid pressure for actuating said moving means; means for controlling pressure fluid for operation upon said fluid pressure operating means; and means operative to render said fluid controlling means operative when tubes are removed from said support; substantially as described.

13. Apparatus of the character described including a magazine for holding tubes to be operated upon; means for moving said tubes from the magazine; rolls forming a support for said tubes when moved by said moving means; means for heating said tubes between their ends while on said rolls; other rolls of less diameter than said first rolls and normally out of engagement with said tubes while on said first rolls; other rolls adapted to bear on said tubes at a position approximately over said second mentioned rolls whereby portions of the tubes will be moved into engagement with said second mentioned rolls when the tubes become softened by said heating means, said third

mentioned rolls being disposed at an angle to apply tension to said heated tubes in opposite directions whereby the tubes will be separated and moved off of said first and
5 second mentioned rolls and allow said third mentioned rolls to move downward; means for effecting actuation of said tube moving means; and means movable by said third mentioned rolls during their downward
10 movement to render said latter actuating means operative; substantially as described.

14. Apparatus of the character described including a support; means for moving articles to be operated upon onto said sup-
15 port; means for bearing upon said articles while being operated upon; a pressure

cylinder; a piston therein; a valve for controlling admission of pressure fluid to said cylinder to actuate said piston, said piston being connected to said tube moving means; 20 and means operatively connected to said bearing means for operating said valve when said tubes are moved from the support; substantially as described.

In testimony whereof I have signed my 25 name to this specification in the presence of two subscribing witnesses.

ROBERT KOENIG.

Witnesses:

ELIZABETH GORBE,
CHAS E. POTTS.