

S. E. WINDER.  
BOTTLE BLOWING MACHINE.  
APPLICATION FILED JUNE 27, 1908.

927,913.

Patented July 13, 1909.

3 SHEETS—SHEET 1.

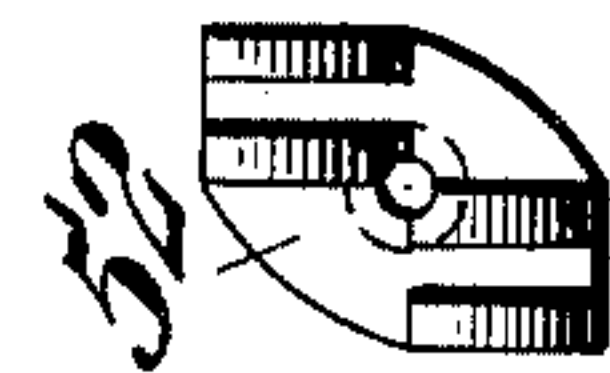
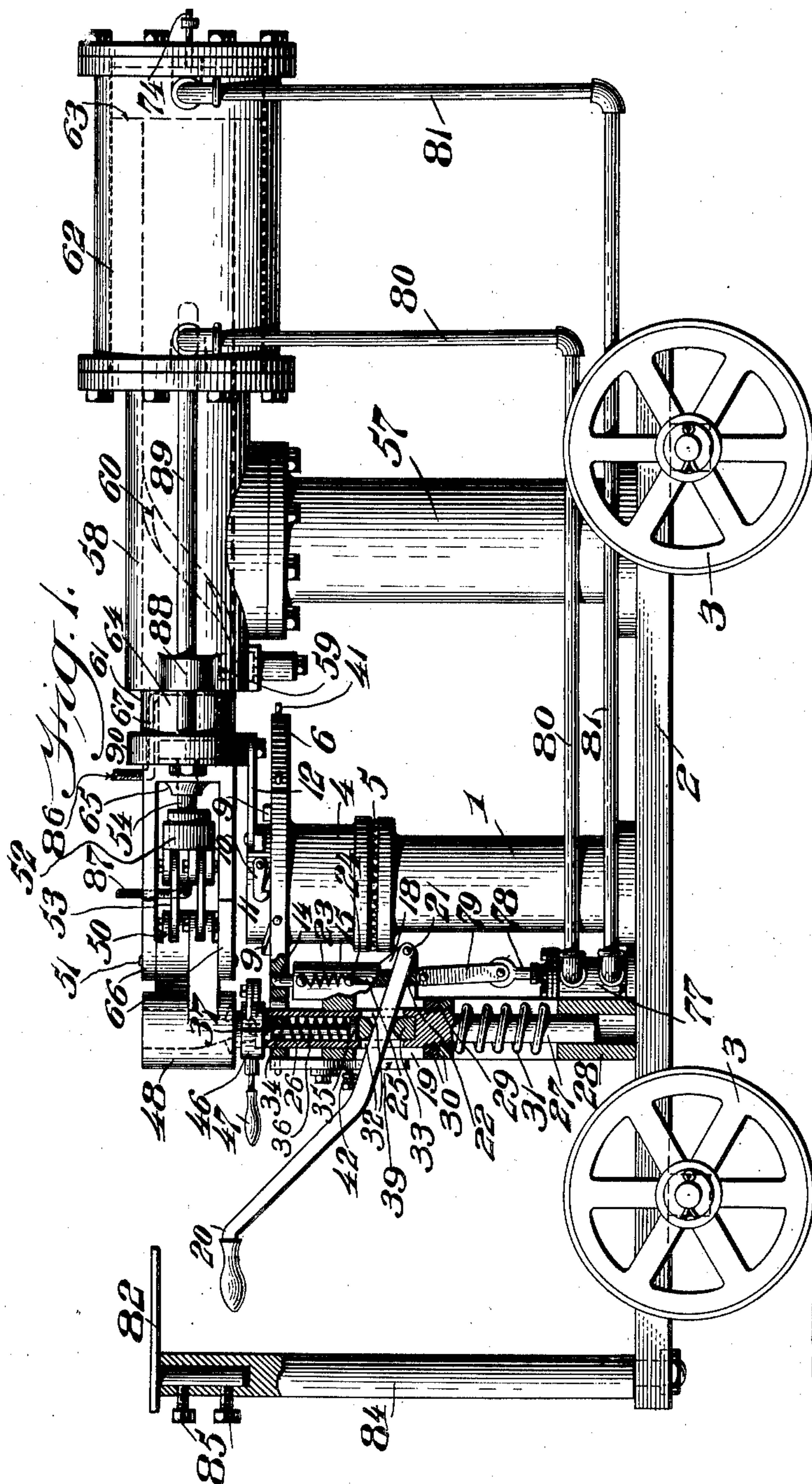


Fig. 7.

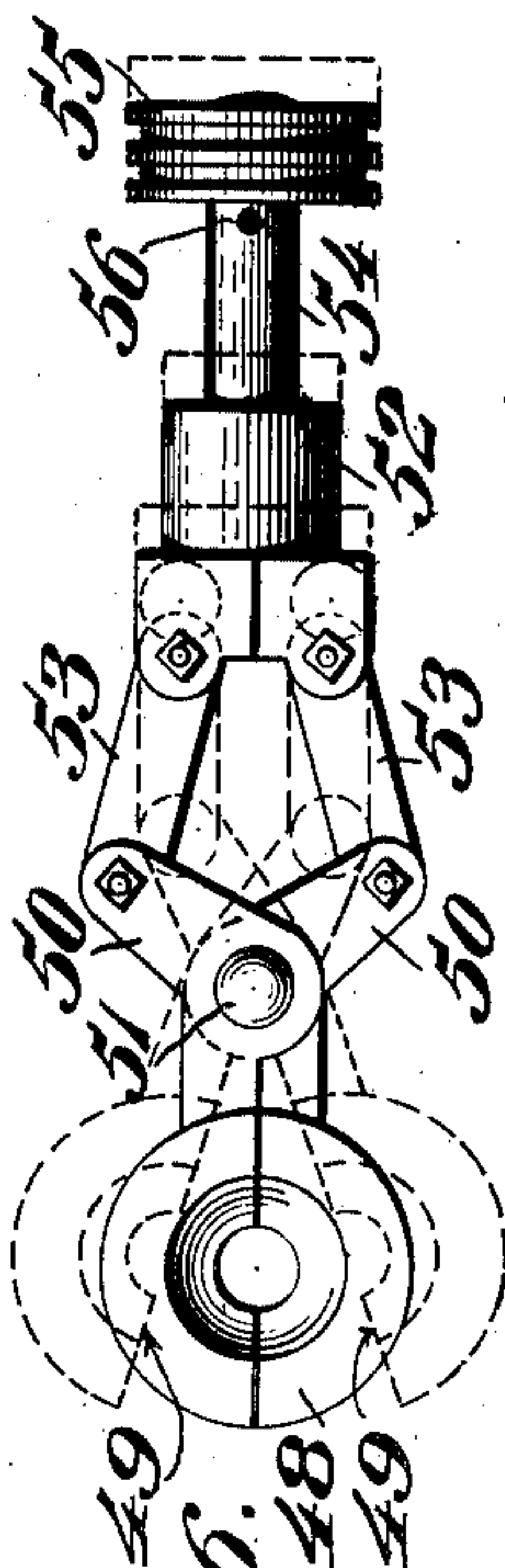


Fig. 6.

Witnesses  
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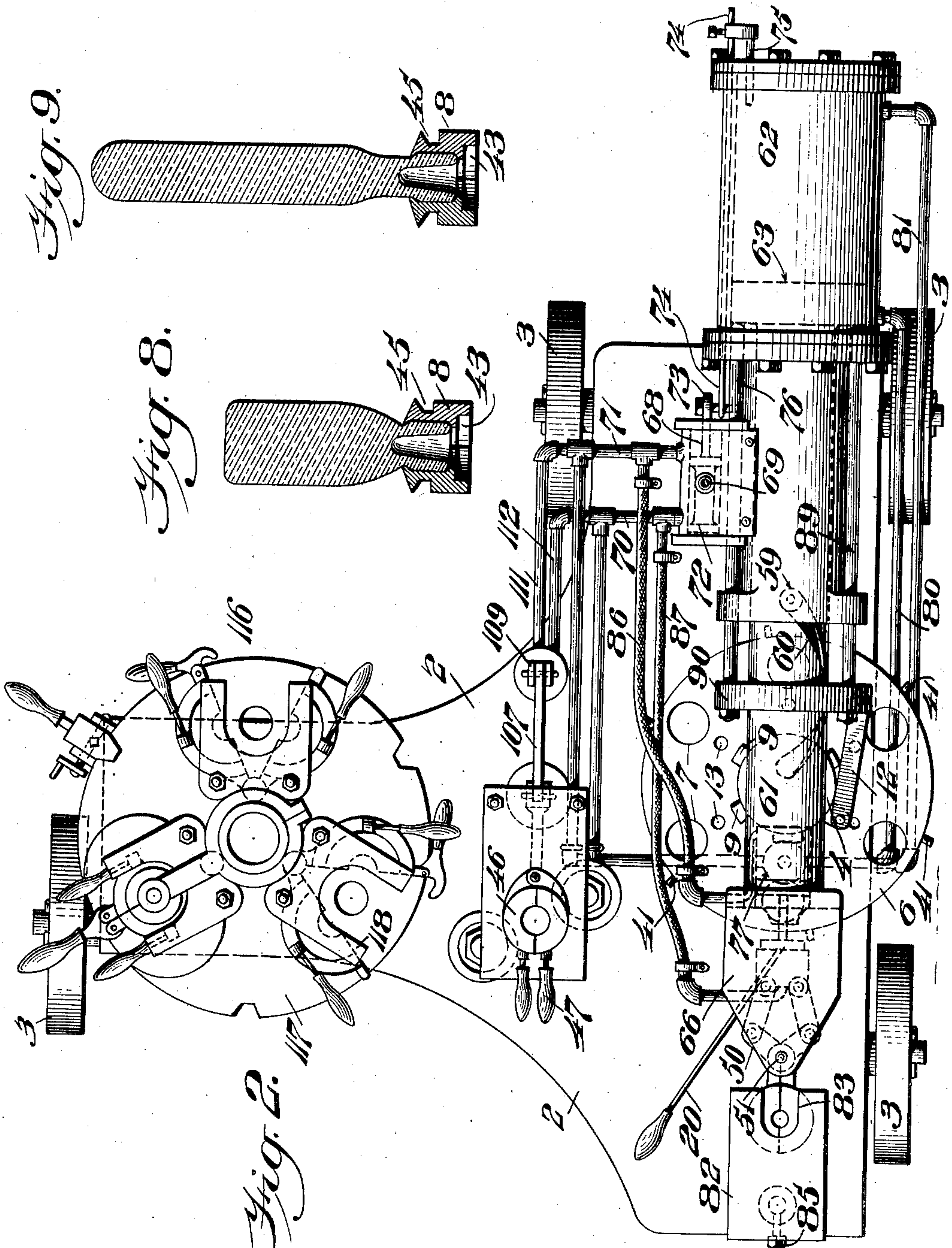
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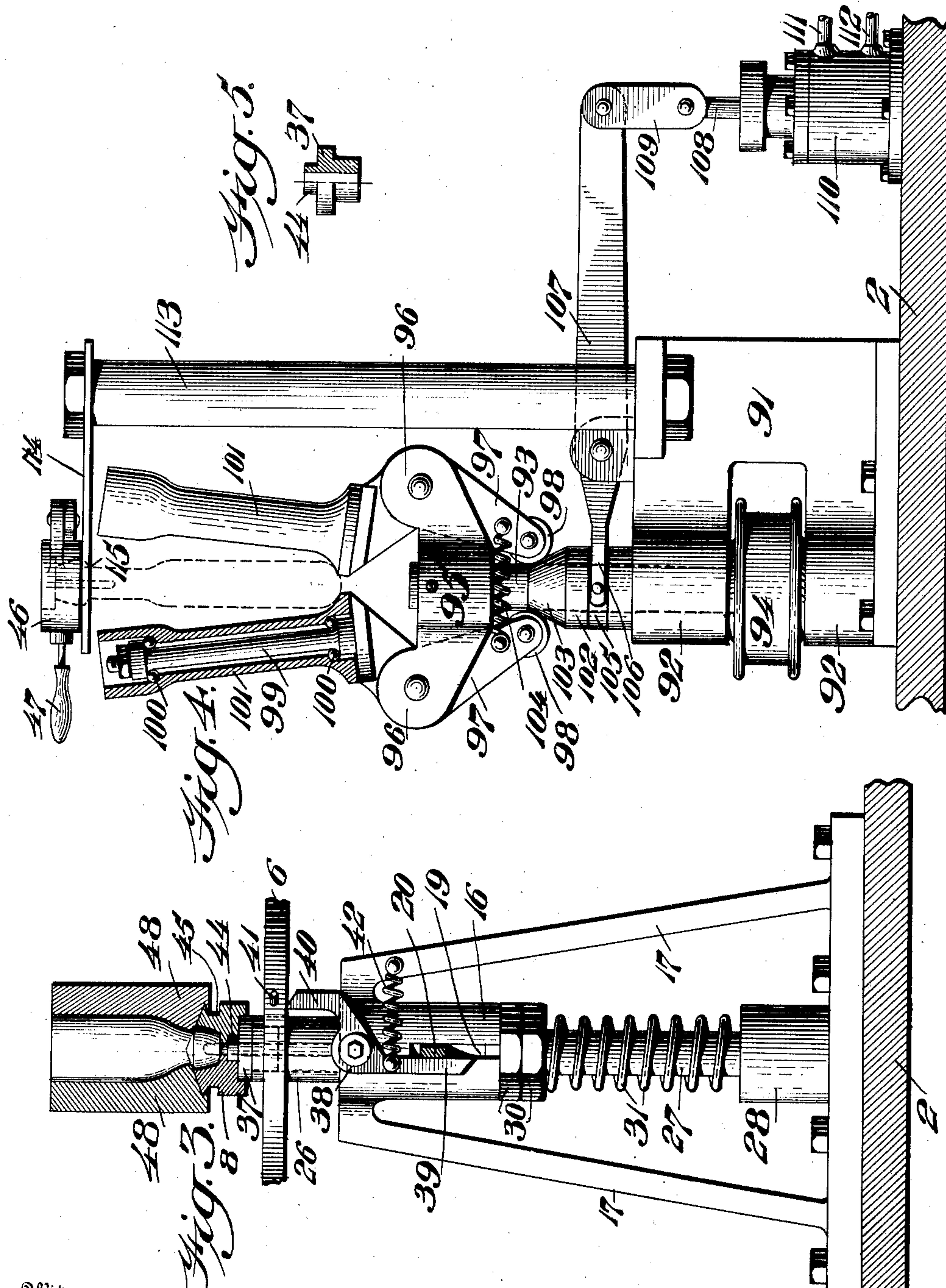


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3 SHEETS—SHEET 3.



Witnesses

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# UNITED STATES PATENT OFFICE.

SAMUEL E. WINDER, OF SALEM, NEW JERSEY, ASSIGNOR OF ONE-HALF TO J. DALE DILWORTH, OF SALEM, NEW JERSEY.

## BOTTLE-BLOWING MACHINE.

No. 927,913.

Specification of Letters Patent.

Patented July 13, 1909.

Application filed June 27, 1908. Serial No. 440,697.

*To all whom it may concern:*

Be it known that I, SAMUEL E. WINDER, a citizen of the United States, residing in Salem, in the county of Salem, State of New Jersey, have invented a new and useful Bottle-Blowing Machine, of which the following is a specification.

This invention relates to a machine for making glass bottles and more particularly that type of bottle having a long narrow neck and has for an object to provide a bottle former in which the amount of material to be used in the formation thereof may be accurately determined for each bottle and the material so shaped as to produce a substantially uniform thickness in the completed bottle. Heretofore in the manufacture of bottles of this type the proper shaping of the material previous to the blowing operation, has required a large amount of hand manipulation to properly distribute the molten glass so that when air is forced into the neck it will act against an even thickness of glass and will produce a bottle with a long neck.

It consists of a novel means for forming the neck of a bottle with an aperture in the same so that when pressure is admitted into said aperture, it will be exerted downwardly and outwardly and will cause the molten metal to expand and completely fill the mold in which it is located at this time.

It further consists of a mechanism for working and shaping the body of the material after the neck and mouth of the bottle have been formed, so that the contour of the material may closely approximate that of the bottle which is to be blown therefrom, so that under internal pressure this shape will practically remain the same, since the expansion of all parts will be very nearly equal.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a side elevation partly in section, of a machine embodying my invention. Fig. 2 represents a plan of the same. Fig. 3 represents an end elevation of manually operated portion of the machine. Fig. 4 represents a side elevation of the centrifugal roller mechanism. Fig. 5 represents a detail of the feed operating plunger. Fig. 6 represents a plan of my clamping jaws and operating piston therefor. Fig. 7 represents a detail of the head supporting the clamp

operating toggle. Fig. 8 represents a section of a neck former showing a bottle in process of formation. Fig. 9 represents a similar view showing the next step in the bottle forming process.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—for the purpose of illustrating my invention, I have shown the preferred form used by me which has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein set forth.

1 designates a standard mounted on a suitable base 2, which may, if desired, be carried by wheels 3 in order that the device may be conveniently moved from one part of a shop to another. The standard 1 carries thereon a head 4, which is mounted on a suitable bearing 5 so that it may have a movement relative to the standard 1. The head 4 is preferably provided with a shoulder in order to receive thereon a table 6 provided at suitable intervals in the surface thereof with apertures 7 adapted to receive a bottle neck former 8. The openings 7 carry the formers 8 forward as the table 6 is revolved step by step, so as to bring them into proper position to be engaged by a cooperating portion of the machine at the correct time. In order to rotate the table 6 to perform this step by step operation, lugs 9 are secured in any well known manner to the table 6 and located approximately the same angular distance apart as the openings 7 and are each adapted to be engaged by a pawl 10 pivotally secured to an extension 11 of the head 4, so that it will be clear that as the head 4 is rotated in one direction the pawl 10 will ride up over the lugs 9 and drop by gravity behind the same, whereupon rotation in the opposite direction through the cooperation of the lug 9 and pawl 10, will carry the table 6. This oscillation of the head 4 is effected by an arm 12 suitably secured to the extension 11 and joining a moving portion of the machine, to be hereinafter described. Apertures 13 are provided in the table 6 and spaced apart at intervals corresponding to the openings 7 and are adapted to cooperate with a locking



pin 14 so that the parts may be properly set in correct relation with respect to other parts of the machine. This stop pin 14 is slidingly mounted in a projecting bracket 15, preferably formed integral with a hub 16 forming a part of a frame 17 carried by the base 2. The hub 16 has rearwardly extending wings 18 forming opposite sides of a slot 19 and slidingly mounted within which slot is a lever 20 carried by a pivot 21 on the wings 18. This lever 20 is in operative engagement with the sliding pin 14 through the medium of a recess 22 in the side of the pin 14, whereby as the lever is swung downwardly the pin 14 will have a corresponding movement. A spring 23 is fixedly secured at one end to the bracket 15 and at the other is connected to a pin 24 carried by the pin 14 and projecting through a slot 25 in the sides of the bracket. It will be clear, therefore, that as the lever 20 is depressed the pin 14 will be withdrawn from one of the locking apertures 13, thus releasing the table 6 so that upon a movement of the head 4 it may rotate a portion of a revolution and as soon as the lever 20 is released the spring 23 tends to return the pin 14 to normal position again, which occurs when the next adjacent aperture 13 comes into the path of movement of the upwardly pressed locking pin 14.

26 designates a hollow piston having a stem 27 formed integral therewith, the former being adapted for a sliding movement in the hub member 16 and the latter having a guide block 28 suitably positioned relative thereto. A portion of the stem 27 is provided with a thread 29 for the purpose of receiving adjusting nuts 30 whereby the upward movement of the hollow plunger 26 may be limited and varied as desired. Between the guide block 28 and the adjusting nuts 30 a spring 31 is provided, which normally tends to maintain the hollow plunger in normal position. The function of the hollow plunger is to raise the former 8 from its position in the opening 7 in the table 6 at a certain time in the cycle of operations. Of course provision must be made in the hollow plunger 26 for the lever 20 passing through the hub 16 and therefore slots 32 are cut on opposite sides and in alinement with each other to permit correct operation of the aforesaid lever.

33 designates a slotted guide block located within the hollow plunger 26 and adapted to be engaged by the lever 20, whereby a plunger 34 having an end suitably shaped to punch a hole of the proper diameter in the neck of a bottle is operated. This plunger is provided with a flanged head 35 abutting which is a spring 36, the tendency of which is to hold the plunger 34 well within the hollow plunger 26. A guide block 37 is seated on the hollow plunger 26 and serves to direct the plunger 34 into the neck of the bottle

forming material, the external diameter of the block 37 being of a width corresponding to a seat in the neck former 8.

It will be apparent that as the lever 20 is given a downward movement that besides withdrawing the locking pin 14 from the table 6, the hollow plunger 26 will also be moved downwardly so as to be withdrawn entirely below the table 6 and the spring 31 thereby put under compression. As soon as the lever is released this spring 31 will tend to return the hollow piston to its operative position and in order that it may not contact with the bottom of the table 6, thus producing a braking effect thereon, a stop member 38 is suitably pivoted to the hub 16. This stop member 38 is provided with oppositely disposed arms 39 and 40, the former being adapted to prevent the upward movement of the lever 20 and the latter being adapted for successive engagement with each of a series of stops 41 suitably located at intervals about the periphery of the table 6. In the present instance a spring 42 is provided to maintain the arm 39 in locking engagement. As soon as the lever 20 reaches its lowermost position the spring 42 immediately swings the arm 39 above the lever 20 and thereby prevents a spring 31 from returning it to normal position when the operator releases the same. It is, however, necessary to have the hollow plunger return to normal position at a definite time in the cycle of operations and therefore the stops 41 are so positioned that one of them will engage the trip arm 40 and release the locking arm 39 at this predetermined time, whereby the hollow plunger immediately makes its return movement. The function of the plunger 26 is to remove the neck former 8 from the table 6 and the former is therefore provided with a seat 43 of a diameter corresponding with the extension 44 of the guide block 37. The former 8 is provided with a circumferential groove 45 adapted for locking engagement with a clamping member to be presently described, while the interior of the former 8 is so shaped as to form the pattern for the neck ring of a bottle. A clamping member 46, preferably formed in two parts pivotally secured together and operated by suitable handles 47, is provided and is adapted to be clamped on the neck former 8 so that the same may be moved from one part of the machine to the other while in its heated condition.

48 designates clamping jaws provided with a gather receiving opening 49 and having bell crank extensions 50 formed integral therewith and pivoted at a point 51 so that as the extensions 50 are thrown outwardly the clamping jaws 48 will be drawn out, and vice versa. This movement is produced in any desired manner, but in the present instance a head 52 is secured to the bell cranks



50 by means of links 53, whereby a toggle like joint is effected and the head 52 is connected by piston rod 54 with the operating piston 55. In the present instance the piston rod 54 is hollow in order to convey motive fluid to one side of the piston 55, as indicated by the inlet port 56. The piston 55 is guided and operated by the mechanism now to be described.

10 57 designates a standard mounted on the base 2 and carrying thereon the cylinder 58 at a suitable point on the interior of which is located a cam roller 59 adapted for engagement with a cam groove 60 of a piston rod 61. This piston rod 61 passes through the cylinder 58 and enters a cylinder 62 securely bolted to the cylinder 58 and of such an internal diameter as to receive a piston 63 affixed to the piston rod 61. One end of the piston rod 61 is counterbored as shown at 64 to receive the piston 55, a suitable plate 65 being provided to close the cylinder opening and forming a stuffing box through which the piston rod 54 operates. This plate 65 is provided with extension members 66 through the ends of which the pivot pin 51 of the clamping members passes and thereby firmly supports the entire jaw structure. A port 67 is provided at a suitable point in the piston rod 61 so as to communicate with the opposite side of the piston 55 from the inlet port 56, thereby providing means for reciprocating the said piston.

Attached in any desired manner to the side of the cylinder 58 is a casing 68 inclosing a slide valve structure of ordinary type, the motive fluid inlet to which is indicated at 69 and the delivery ports by the pipes 70 and 71. A valve 72 controls the admission of motive fluid to one or the other of the pipes 70 and 71, the operation of which is accomplished by a link 73 attached to the slide valve 72 and joining a rod 74, which passes through the cylinder 62 and to the end of which is secured a trip arm 75 that passes through the head of cylinder 62 and into the cylinder a sufficient distance to be engaged by the piston 63 on one of its strokes. A second trip arm 76 is secured adjacent to the bracket 73 and passes through the opposite end of cylinder 62 a like distance to be engaged by the piston 63 when it is at that end of the other stroke. It will be clear therefore that the slide valve 72 is always in position to deliver motive fluid from the inlet 69 to one or the other of the pipes 70 and 71, the selection of which is determined by the position of piston 63.

77 designates a cylinder substantially of similar construction to the cylinder 68 and with which the pipes 70 and 71 communicate at the same point. A slide valve is located within this cylinder 77 and operated by a connecting rod 78, preferably joined by a link 79 to a part operated by the lever 20. Pipes 80

and 81 communicate with the interior of the valve casing 77 and connect the same with opposite ends of the cylinder 62 so that when the valve controlled by the rod 78 is in one position the air will pass through pipe 81 into cylinder 62 and drive the piston in one direction and when the valve is reversed the pipe 80 will become filled with motive fluid and drive the piston 63 in the opposite direction.

It will be clear that as the motive fluid passes through pipe 81 back of the piston 63 and the said piston nears the end of the stroke, that it will engage the trip member 76 and reverse the valve 72 so that as soon as the connecting rod 78 of the valve chamber 77 is also shifted the motive fluid will immediately be supplied through the pipe 80 to return the piston 63 to the opposite end and when at the end of its back stroke it will of course contact with trip arm 75 and thus shift valve 72 to bring about a repetition of the step just described. As the piston 63 moves one way or the other the connected piston rod 67 of course is also carried backward and with it the attached parts carrying the clamping jaws 48. This action of the clamps 48 carries the neck former 8 away from the table 6 and into close proximity to a supporting plate 82 provided with an opening 83 of a diameter sufficient to grasp the neck former 8 by the grooved portion 45. This plate is secured in any suitable manner to a standard 84 in the present instance being adjustable thereon by means of a sliding connection formed by set screws 85. It will be noted in the position shown in Fig. 1 that the movement of the clamping jaws 48 toward the plate 82 would not bring the neck former 8 in proper position relative to the plate 82 but instead would be at approximately the length of a bottle below the same and therefore in order to bring the parts together and thereby position the neck former correctly for the succeeding steps, the cam slot 60 in the piston rod 61 is provided. The function of this part will be clear for as the piston rod 61 makes a movement the cam roller 59 engages with the slot 60 and thereby imparts a partial turn to the clamps, this inverting the position of the neck former 8. As soon as the clamps 48 have been given this turning movement the motive fluid is admitted back of the small piston 55, giving a longitudinal movement of the piston rod 54 and operating the toggle connection to release the clamps so that the former 8 is thereby accurately placed in the opening 83 of the plate 82. Supply pipes 86 and 87 are provided to supply fluid from the valve chest 68 to the opposite sides of the piston 55 and are preferably of a flexible nature to allow of the reciprocating movement.

88 designates bearing brackets joined to opposite sides of the cylinder 58 and are pro-



vided to receive rods 89 which pass through the head of cylinder 62 into the interior thereof into the path of movement of piston 63. The opposite ends of these rods are  
 5 fastened in any desirable manner to a collar 90 loosely mounted on piston rod 61 and to this collar is bolted the operating link 12 of the head 4. The manner in which this return is effected will now be clear, since as  
 10 soon as the piston 63 strikes the projecting rods 88 the collar 90 will move back in unison with the piston 61 until at the end of the stroke the pawl 10 is dropped behind the lug 9. At this time the neck former 8 is deposited  
 15 on the plate 82 and the return stroke begins, whereupon the shoulder formed by the plate 65 immediately abuts the collar 90 and carries it forward, thus advancing the pawl 10 and partially rotating the table 6.

20 Located adjacent the standard 1 on the base 2 is a bracket 91, forming bearings 92 for a shaft 93 normally maintained in rotation by a pulley 94 thereon and which may be driven by any suitable well known mechanism. Pivotaly secured to the shaft 93 for  
 25 rotation therewith is a head 95 having on either side wings 96, to each of which is pivoted a bell crank 97 carrying at one end a roller 98 and at the other end a spindle 99. These spindles 99 are preferably provided  
 30 at either end with a ball run way 100, whereby a bearing is formed between the spindles 99 and a tubular roller shaper 101. It will therefore be seen that the tubular roller shapers are capable of a rotary movement entirely  
 35 independent of the movement of the spindles 99, which are of course revolving on the shaft 93. Particular attention is directed to the function of these rotary shapers, since the configuration of the finished bottle substantially depends on their action, as also the  
 40 production of a bottle of uniform thickness. The surface of these shapers is comparatively at a low temperature with respect to that of the molten glass and therefore as  
 45 soon as the partially formed bottle is placed between the shapers and contacts therewith it will immediately become chilled and the entire surface be hardened for a very slight  
 50 depth. Within this outer shell of hardened glass is a layer of molten glass in a yielding state, which is readily acted upon by air pressure and consequently as soon as this pressure is applied through the neck of the  
 55 partially formed bottle, the outer chilled surface gradually expands in a uniform manner. It will thus be clear that the correct shape of the bottle is maintained, there are no irregularities in the surface thereof and it is of uniform thickness throughout, all of which are  
 60 essential, desirable qualities in the manufacture of glass bottles of this type.

102 designates a sleeve slidingly mounted on shaft 93 and provided with a cone surface  
 65 103, the function of which is to force out-

wardly the rollers 98 and consequently the bell cranks 97, whereby the spindles 99 and shapers 101 are brought together. Return of these parts to their normal position is accomplished in any desired manner, in the  
 70 present instance by means of a spring 104 joining the two bell cranks 97 at a point adjacent the rollers 98. The shifting of the sleeve 102 is accomplished preferably by a collar 105 secured in a groove of the sleeve  
 75 and engaged by a forked end 106 of a lever 107 suitably pivoted to the bracket 91. The operating end of the lever 107 is connected to a piston rod 108 through the medium of a link 109, the said piston rod being operated  
 80 by fluid pressure admitted to cylinder 110 at stated intervals. Pipes 111 and 112 communicate with opposite ends of the cylinder 110 and are connected directly to pipes 70 and 71 of the main motive supply passing through  
 85 the valve member 68. Suitably supported on bracket 91 is an upright 113 adapted to support a plate 114 directly above the shapers 101, the said plate being provided with an opening 115 of sufficient diameter  
 90 to allow the insertion of the partially formed bottle, the clamp 46 resting directly on the plate 114.

At a convenient point on the base 2 a blow mold apparatus 116 is situated and is substantially of a well known construction, the details of which form no part of my invention and it is considered unnecessary to furnish a full description thereof. In general, this  
 95 consists of a rotating table 117 carrying a plurality of mold clamps 118 which are adapted, when closed, to form a mold for the bottle which is to be blown. The adjacent parts of the machine have already formed the neck and neck ring of the bottle with an  
 100 opening therein, and the remaining portion of the gather, after manipulation by the shapers, is ready for the blowing operation, which takes place as soon as placed in the molds 118. These molds are of course  
 105 clamped together and an air pressure head brought down over the mouth of the partially formed bottle and as soon as the air is admitted the material is blown immediately to the correct bottle shape.  
 115

The operation of my machine is as follows:—Two operators are preferably employed in the manipulation of the machine, operator A standing adjacent the mold table  
 116 and operator B in position by lever 20.  
 120 In order to start the machine in operation the air pressure from a suitable supply is turned on and at this time has a free access through port 69 and pipe 71 to the cylinder 77, from which it passes to pipe 81 and is  
 125 admitted to the cylinder 62 to actuate piston 63, which at this time is in the position indicated in dotted lines in Fig. 1. This pressure forces the piston 63 out on its forward stroke, near the end of which it con-  
 130



tacts with the collar operating rods 89 to oscillate the head 4 so that the pawl 10 drops behind a lug 9 of the table 6. Neck formers 8 are placed by operator A in their respective apertures 7 of the table 6 and operator B then depresses lever 20, whereupon the stop pin 14 is removed from the opening 13 and the table is free to make a partial rotation. As the lever 20 is lowered the link 79 carries the valve stem 78 with it so as to shift the valve in cylinder 77 to admit pressure to the pipe 80. At this time piston 63 has reached the end of its forward stroke as indicated in dotted lines in Fig. 2 and has operated trip arm 76 to shift the position of valve 72 and allow the pressure to pass through pipe 70 to valve chamber 77 and thus by pipe 80 to the rear of cylinder 63 to make its return stroke. This piston 63 is thereupon forced to the other end of the cylinder 62 and carries the plate 65 and bracket member 66 with it and into contact with the collar 90 so that the latter is also moved forward and brings the pawl 10 into engagement with lug 9 to rotate the table a sufficient distance to bring one of the formers 8 directly over the plunger 26. The lever 20 up to this time has been held in the lower position through the catch 39, which has been shifted by the spring 42 and thus maintains the parts locked during the rotation of the table 6. As soon as one of the trip pins 41 on the table 6 engages the arm 40 of the catch lever, it removes the latter from locking engagement, whereupon the spring 31 quickly returns the lever 20 and hollow plunger 26 to normal position. This is best shown in Fig. 1, the ends of the plunger passing through the opening 7 in the table a sufficient distance to raise the neck former 8, which is of course picked up in the passage of the plunger through the opening. As soon as the former 8 has reached this position, it is in place to be accurately engaged by the clamping receiver 48, which is at this time brought into closed position by a rearward movement of piston 55. The return of piston 55 has in the meantime occurred through the admission of air by the conduit 87 and hollow piston rod 54. The position of the receiver 48 at this time is shown in Fig. 3 and the molten glass is poured thereinto. Operator A now gives lever 20 a slight upward movement to raise the plunger 34, thus forming an opening into the neck of the bottle of some considerable depth, having accomplished which the machine is ready for a repetition of the steps just described. It will be noted that when the piston 63 reaches the extreme end of cylinder 62 on the return stroke, that is as indicated in Fig. 1, that the trip arm 75 will be operated to shift the valve 72 so as to restore these parts to their initial position. Of course it will be understood that during the reciprocation of the piston 63 that the parts

attached to the piston rod 61 are being operated to perform another step, that of conveying the partially formed bottle from this position on the table 6 to the plate 82. It will be clear that as the piston rod 61 makes its forward stroke that the cam slot 60, through engagement with the cam roller 59, will give a half turn to the receiver 48, whereby the neck former is inverted and deposited in place on the plate 82. Just at the instant that the receiver comes into position adjacent the plate 82, air has a free access behind the piston 55 and forces the same outwardly a sufficient distance to release the formers from clamping position, thereby leaving the neck former and the molten material attached thereto in position on the plate 82. As the clamps are released the piston 63 operates trip 76 to change the direction of the flow of air from the valve 77 and the movement of piston 55 is reversed to bring the members 48 together into receiving position. Operator B now removes the neck former 8 from this plate and inserts the partially formed bottle still in a heated condition through the opening 115, between the shapers 101. At this stage the shapers are in open position as shown in Fig. 4, since the pipe 112 is in communication with the pipe 70 and valve rod 108 raised to operate lever 107 and lower the slide sleeve 103 so that the spring 104 may draw the bell cranks together at their lower ends and project the spindles 99 outwardly.

It will of course be understood that during the time that the shapers are in open position operator A is removing the partially molded bottle therefrom and placing the same in position in the blow mold mechanism and operator B takes the deposited neck former from the plate 82 and drops the gather through the opening 115 between the shapers in the place of the one which has just been removed. These shapers are open a sufficient time to allow conveniently both of these operations, since they are held in open position during the entire forward stroke and then remain closed, shaping the molten glass during the return stroke of piston 63.

Attention is called to the rotation of the shaft 93 carrying the spindles on which the shapers 101 are mounted, as this rotation is continuous whether the shapers are in open or closed position.

It will be understood that as soon as operator A has removed the material from the shapers, operator B takes another neck former from the machine and places it between the rollers and operator A places another neck former in a recess 7 of the table 6.

In Fig. 8 the first step of the machine is well illustrated, the gather of glass having been molded by the neck former 8 and an opening has been punched therein for the ad-



mission of air at the proper time. Fig. 9 represents the next step in the operation, wherein the molten material of Fig. 8 has been drawn out and rolled in the revolving portion of the machine. As soon as the glass has assumed this latter shape it is ready for the blow molding machine, in which it is placed by operator A and the clamps securely locked around it so that when the air pressure head is brought down over the mold of the bottle, there will be no escape for the pressure and the same will be forced into the opening in the neck of the bottle. This pressure acting upon the mass of red hot yielding glass, will expand the same to fill the mold and produce a bottle of the size and shape desired. It will be understood that the shape and thickness of the completed bottle depend largely upon the effect produced by the contact of the molten glass with the chilled surface of the rollers 101.

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

25 1. In a device of the character described, a neck former, a support therefor mounted for reciprocation, a receiver cooperating with said neck former to receive a gather, automatic means to shape said gather for delivery to a blow mold machine, means to reciprocate and invert said receiver.

30 2. In a device of the character described, a neck former, a plunger adapted to support said neck former, a receiver clamp cooperating with said neck former to receive a gather, means to form an opening in the neck of said gather and means to reciprocate and invert said receiver.

40 3. In a device of the character described, a neck former having a seat therein, a bushing for said seat, a plunger supporting said bushing; a clamp cooperating with said neck former to form a receiver for a gather, means to reciprocate said plunger and bushing, and means to insert a member through said neck former into the receiver clamp.

45 4. In a device of the character described, a neck former having a seat therein, a hollow plunger carrying a bushing adapted to fit the seat in said neck former, a lever to move said hollow plunger in one direction, a lock for said lever, and means to release said lock at a certain time.

50 5. In a device of the character described, a neck former having a seat therein, a hollow plunger carrying a bushing adapted to fit the seat in said neck former, a member adapted for sliding movement in said bushing, and a lever for operating said hollow plunger in one direction and said member in the other direction.

60 6. In a device of the character described, a neck former having a seat therein, a hollow plunger carrying a bushing supporting said neck former, a lever for operating said

hollow plunger in one direction, means to return said hollow plunger to normal position at a certain time, and means to limit the return movement of said hollow plunger.

70 7. In a device of the character described, a neck former having a seat therein, a hollow plunger carrying a bushing supporting said neck former, a lever for operating said hollow plunger in one direction, means to return said hollow plunger to normal position at a certain time, and means to adjust the return stroke of said plunger.

80 8. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a clamp cooperating with said neck former to form a gather receiver, and reciprocating means to remove said neck former from said table at a certain time.

85 9. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a clamp cooperating with said neck former to form a gather receiver, a plunger to remove said neck former from said table, a lock to hold said plunger in inoperative position, and means to release said lock at a predetermined time.

90 10. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a clamp cooperating with said neck former to form a gather receiver, a plunger to remove said neck former from said table, a lock to hold said plunger in inoperative position, and means on said table to release said lock at a predetermined time.

105 11. In a device of the character described, a standard, a table carried thereby, a plurality of neck formers detachably secured to said table, a clamp cooperating with each neck former to form a gather receiver, a plunger to remove each neck former from said table, a lock to hold said plunger in inoperative position, and means to release said lock at a predetermined time.

110 12. In a device of the character described, a standard, a table carried thereby, a plurality of neck formers detachably secured to said table, a clamp cooperating with each neck former to form a gather receiver, a plunger to remove each neck former from said table, a lock to hold said plunger in inoperative position, and means on said table to release said lock at a predetermined time.

120 13. In a device of the character described, a table carried thereby, a plurality of neck formers detachably secured thereto, a clamp cooperating with each neck former, a cylinder supported adjacent said table, a piston therein having a piston rod secured to said clamp, and means to partially rotate said piston rod during its reciprocation.

130 14. In a device of the character described, a standard, a table carried thereby, a plural-



ity of neck formers detachably secured thereto, a clamp cooperating with said neck former, a cylinder supported adjacent said table, a piston therein having a piston rod secured to said clamp, a roller secured interior of said cylinder, a cam surface on said piston rod engaging said roller, whereby said piston rod is partially rotated during its reciprocation.

15. In a device of the character described, a standard, a table carried thereby, a neck former detachably carried by said table, a clamp cooperating with said neck former, a plate suitably supported adjacent said table, and automatic means to place said neck former on said plate.

16. In a device of the character described, a standard, a table carried thereby, a neck former detachably carried by said table, a clamp cooperating with said neck former, a plate suitably supported adjacent said table, and means to place said neck former on said plate in inverted position.

17. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a plurality of clamping jaws cooperating with said neck former and automatic means to open and close said clamping jaws.

18. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a plurality of clamping jaws cooperating with said neck former, a plate supported adjacent said table, means to place said neck former on said plate, and means to open and close said clamping jaws.

19. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a plurality of clamping jaws cooperating with said neck former, a plate supported adjacent said table, a pressure operating piston adapted to move said neck former into position on said plate, means to open said clamps at the end of one stroke of said piston, and means to close said clamps at the other end of the stroke of said piston.

20. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, clamp jaws cooperating with said neck former, a cylinder, a piston therein connected to said clamps, and means to open said clamps at one end of the stroke of said piston, and close said clamps at the other end of said stroke.

21. In a device of the character described, a standard, a table carried thereby, a neck former detachably secured to said table, a plurality of clamps cooperating with said neck former, a cylinder suitably supported adjacent said table, a piston in said cylinder, a rod for said piston having said clamps pivoted thereto, an auxiliary piston in said cyl-

inder connected to said clamping jaws, and means to operate said auxiliary piston at certain times to open and close said clamping jaws.

22. In a device of the character described, a bracket, a driven shaft mounted thereon, a hub secured to said shaft having wings thereon, a plurality of bell cranks pivoted to said wings, spindles on said bell cranks each carrying a shaper adapted to rotate relative to said spindles, a roller secured to each bell crank, and means engaging said rollers to shift said bell cranks to bring said spindles together.

23. In a device of the character described, a bracket, a driven shaft mounted therein, a hub secured to said shaft having wings thereon, a plurality of bell cranks pivoted to said wings, spindles on said bell cranks each carrying a shaper adapted to rotate relative to said spindles, a roller secured to each bell crank, means engaging said rollers to shift said bell cranks to bring said spindles together, and means to return said spindle to open position.

24. In a device of the character described, a bracket, a driven shaft mounted therein, a hub secured to said shaft having wings thereon, a plurality of bell cranks pivoted to said wings, spindles on said bell cranks, each carrying a shaper adapted to rotate relative to said spindles, a roller secured to each bell crank, a sleeve on said shaft having a cone surface, and means to shift said sleeve to bring said spindles together.

25. In a device of the character described, a bracket, a driven shaft mounted therein, a hub secured to said shaft having wings thereon, a plurality of bell cranks pivoted to said wings, spindles on said bell cranks each carrying a shaper adapted to rotate relative to said spindles, a roller secured to each bell crank, a sleeve on said shaft having a cone surface, means to shift said sleeve to bring said spindles together, and means independent thereof to return said spindles to open position.

26. In a device of the character described, a bracket, a driven shaft mounted therein, a plurality of spindles secured to said shaft for rotation therewith, a shaper on each spindle adapted to rotate relative thereto, an upright secured to said bracket, means on said upright for supporting a bottle neck former adjacent said spindles, and means to oscillate said spindles to allow a partially formed bottle to be inserted therebetween.

27. In a device of the character described, the combination of a neck former and a reciprocating receiving clamp for a gather of molten glass, with a plurality of revolving shapers, and means to open said shapers at a predetermined time during the reciprocation of said receiving clamp.

28. In a device of the character described,



the combination of a neck former and a reciprocating receiving clamp for a gather of molten glass, with a plurality of revolving shapers, and means to close said shapers at a  
5 predetermined time during the reciprocation of said receiving clamp.

29. In a device of the character described, the combination of a neck former and a reciprocating receiving clamp for a gather of  
10 molten glass, with a plurality of revolving shapers, and means to control the reciprocation of said clamp and the oscillation of said shapers.

30. In a device of the character described, the combination of a neck former and a re- 15  
ciprocating receiving clamp for a gather of molten glass, with a plurality of revolving shapers, means to control the reciprocation of said clamp, and the oscillation of said shapers, and means to expand said gather to 20  
form a bottle.

SAMUEL E. WINDER.

Witnesses:

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