

No. 711,159.

Patented Oct. 14, 1902.

J. HALEY.

MACHINE FOR FORMING NARROW NECK BOTTLES.

(Application filed Dec. 30, 1901.)

(No Model.)

4 Sheets—Sheet 1.

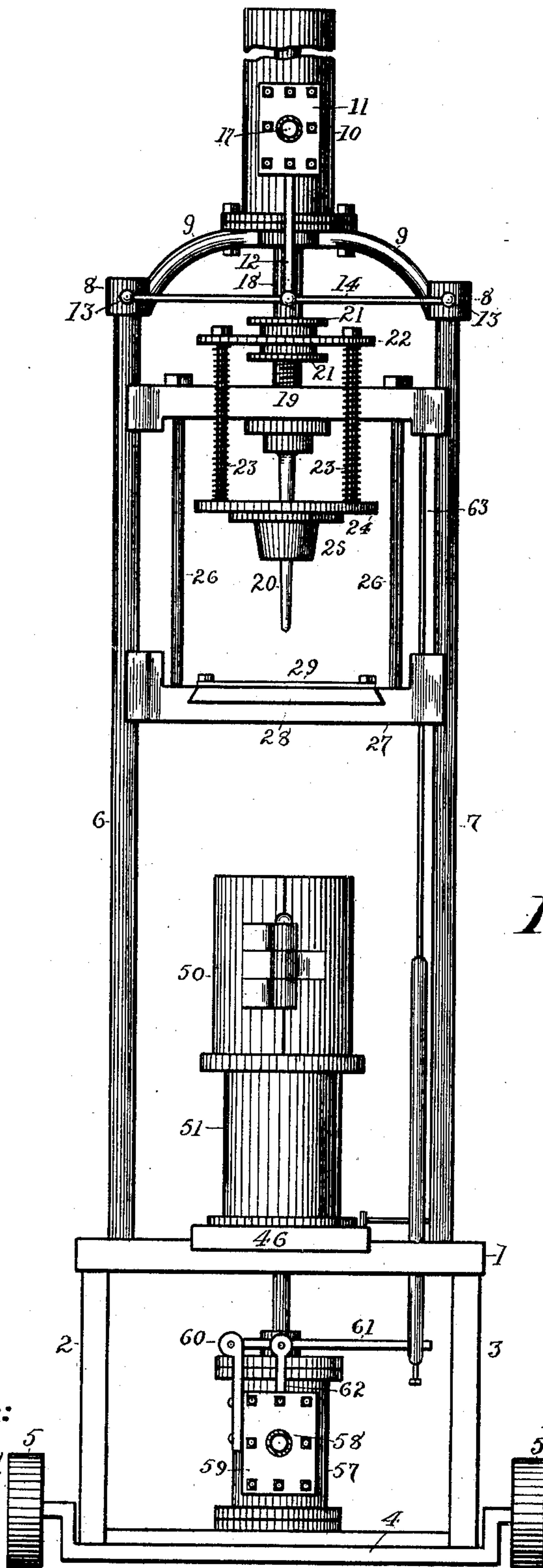


Fig. 1.

Witnesses:

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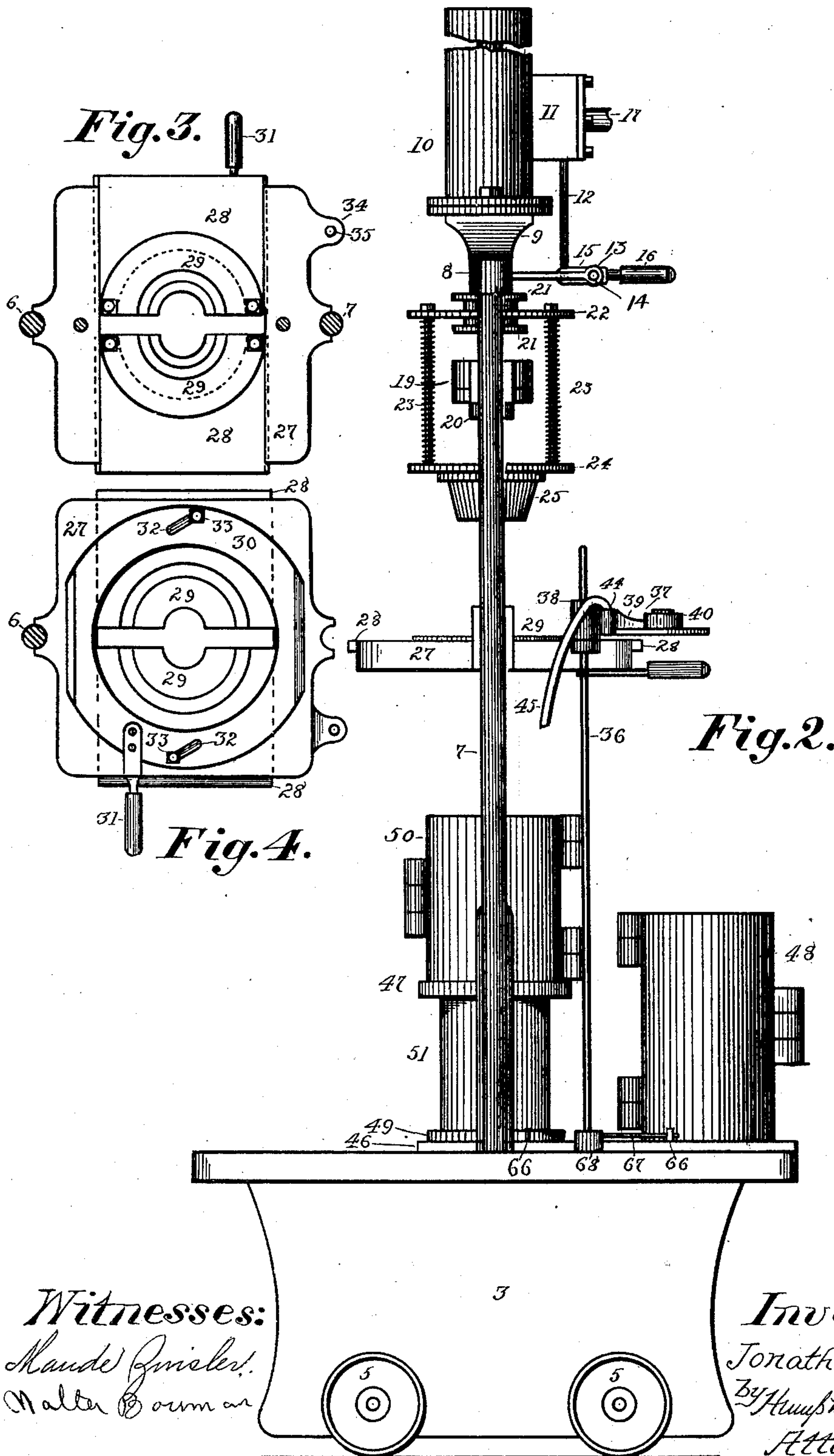
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4 Sheets—Sheet 2.



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4 Sheets—Sheet 3.

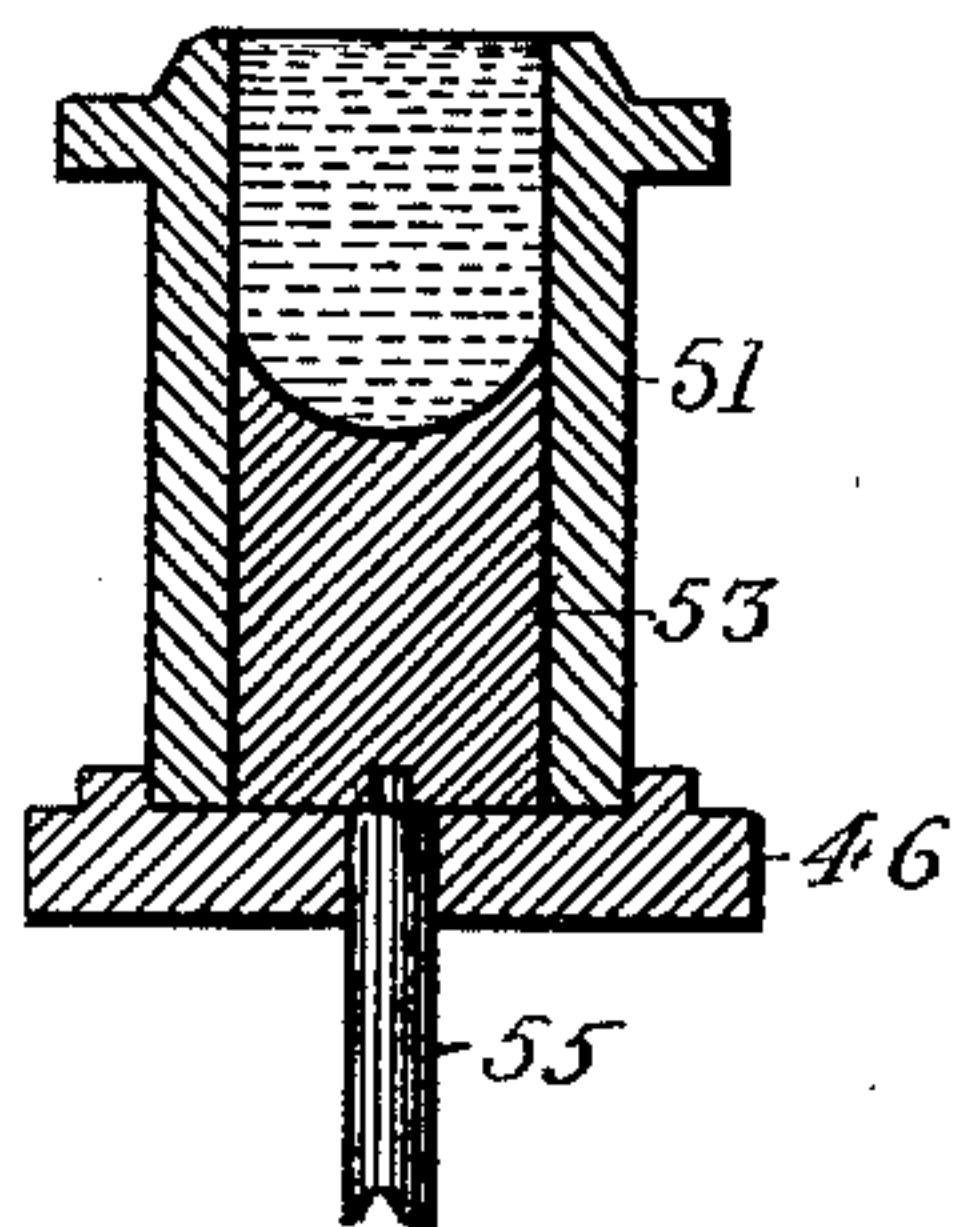


Fig. 5.

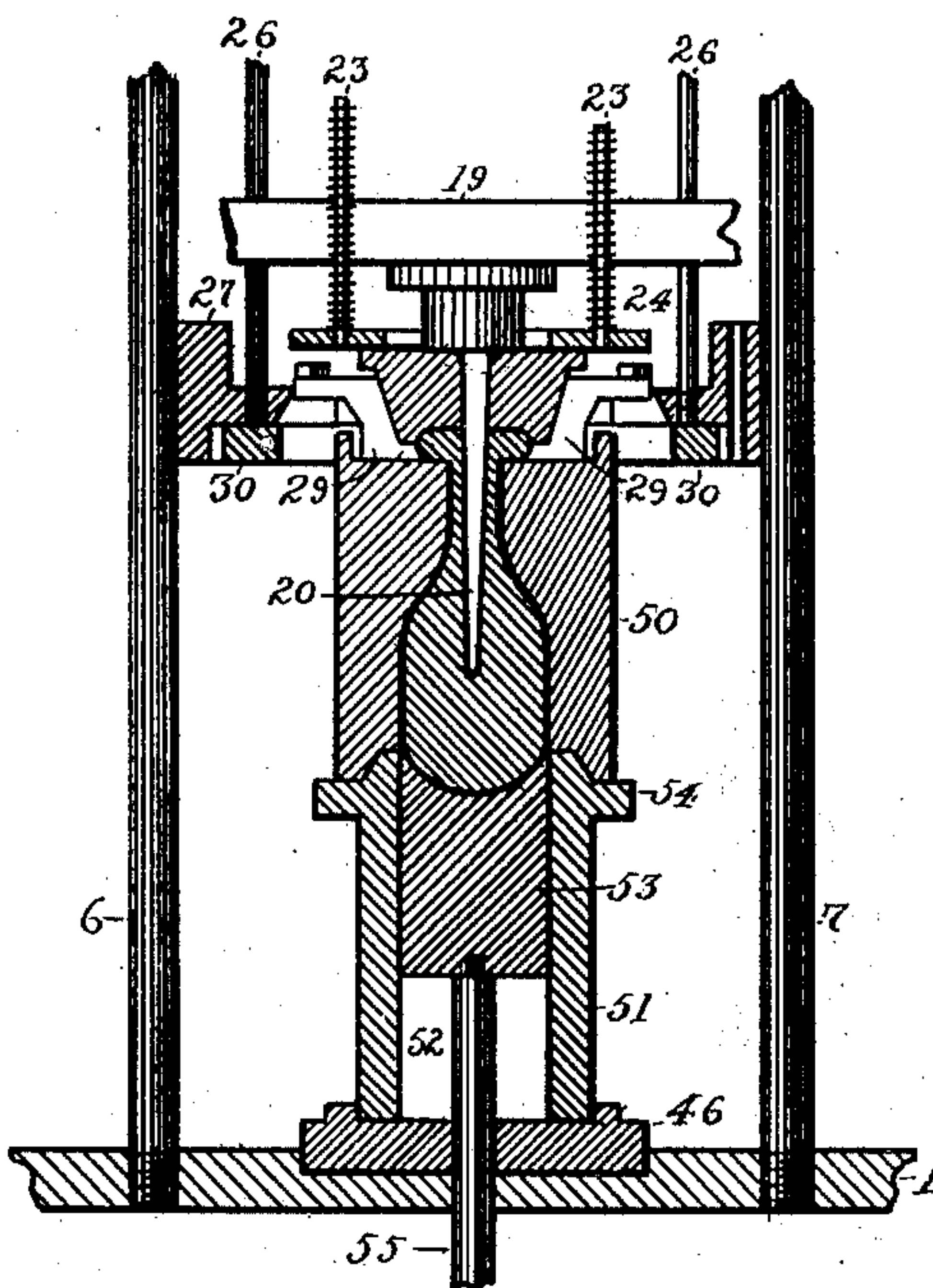


Fig. 6.



Fig. 7.

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4 Sheets—Sheet 4.

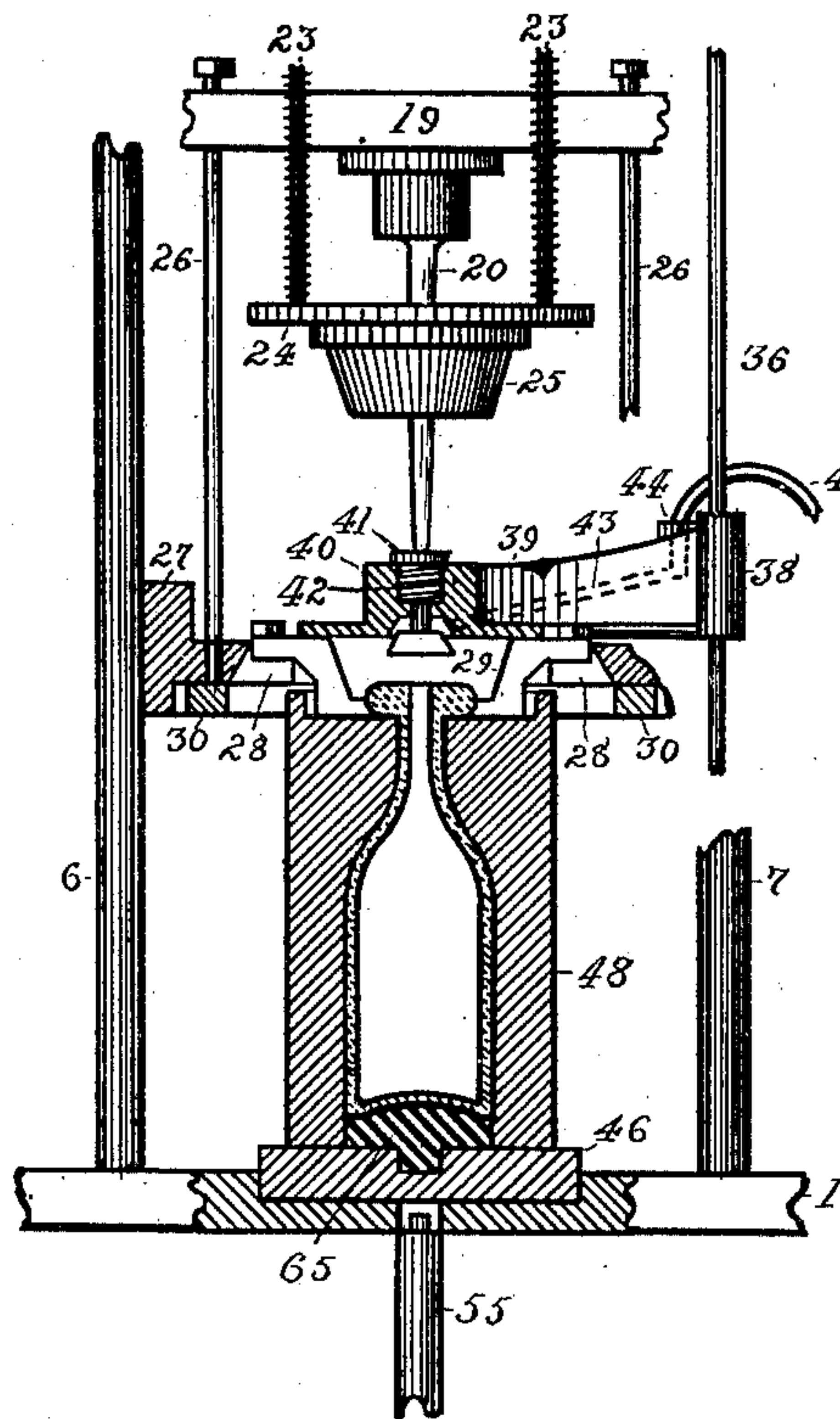


Fig. 8.

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UNITED STATES PATENT OFFICE.

JONATHAN HALEY, OF AKRON, OHIO, ASSIGNOR TO THE AKRON GLASS & MACHINERY COMPANY, OF AKRON, OHIO, A CORPORATION OF OHIO.

MACHINE FOR FORMING NARROW-NECK BOTTLES.

SPECIFICATION forming part of Letters Patent No. 711,159, dated October 14, 1902.

Application filed December 30, 1901. Serial No. 87,752. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN HALEY, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Machines for Forming Narrow-Neck Bottles, of which the following is a specification.

My invention has relation to improvements in machines for producing glass articles, such as bottles, from molten glass, and has a special relation to machines for producing what are commonly known as "narrow-necked" bottles.

The objects of my invention are to produce a machine which shall manufacture from molten glass bottles having narrow necks and which shall be capable of forcing the glass while in a molten state up into the neck-mold during the descent of the plunger into the blank-mold, and, further, to produce a simple and effective machine for the making of small-necked bottles whose operation shall be rapid, positive, and reliable.

To obtain the aforesaid objects, my invention consists in the peculiar and novel construction, arrangement, and combination of parts hereinafter described and then specifically claimed, reference being had to the accompanying drawings, forming a part of this specification.

In the accompanying drawings, in which similar reference-numerals indicate like parts in the different figures, Figure 1 is a front elevation of my machine; Fig. 2, a side elevation; Fig. 3, a top plan of the neck-mold and its accompanying mechanism; Fig. 4, a bottom plan of Fig. 3; Fig. 5, a section of the lower half of the blank-mold; Fig. 6, a section of the blank-mold complete after the descent of the plunger; Fig. 7, a detail of the valve-operating rod, and Fig. 8 a section of the blow-mold at the instant of the opening of the air-valve.

In the drawings, 1 is a working-table top mounted on sides 2 3 of the main frame of the machine, and these sides 2 3 are supported on axles 4, on the ends of which are journaled wheels 5, by which the machine may be conveyed to different parts of the shop for operation.

Rising vertically from the top 1 are parallel guide-rods 6 7, on the upper ends of which

and fastened thereto are caps 8, and rising from these caps are brackets 9, supporting a vertical cylinder 10, on the side of which is a valve-chest 11, from which extends a valve-rod 12 to be operated as follows: From the caps 8 extend posts 13, and between these posts 13 is a rod 14, on which is pivoted a bar 15, (see Fig. 2,) on one end of which bar 15 is an operating-handle 16, and the opposite end of the bar 15 is hinged to the valve-rod 12.

The entire motive power of the machine is compressed air, and this is supplied from any suitable source desired to the valve-chest 11 by a pipe 17.

Reciprocating in the cylinder 10 is a piston, (not shown,) attached to which is a piston-rod 18, bearing on its end a cross-head 19. On the lower part of this cross-head and in alinement with the axis of the cylinder is a slender plunger 20. The piston-rod, adjacent to the cross-head 19, is screw-threaded for a portion of its length, and on the screw-threaded portion are two nuts 21, meshing into the screw-threads on the piston-rod and holding between them a ring 22, from which depend rods 23, which rods are arranged to slide freely through the ring 22 and are held from falling therefrom by nuts on their upper ends. On the lower ends of the rods 23 is suspended a ring 24, constantly downwardly pressed by springs on the rods 23, on the lower part of which is fastened by any desirable means and concentric with the axial line of the piston-rod the ring-mold 25.

Passing loosely through the cross-head 19 are two vertical rods 26, bearing on their upper ends nuts and on their lower ends a sliding frame 27, which frame 27 bears what is known as the "neck-mold." It may be noted that the sides of the cross-head 19 and frame 27 are so shaped as to slide along the surface of the guide-rods 6 7. The frame 27 consists of a flat plate, on the upper surface of which is a dovetailed groove, in which are two sliding plates 28, similarly dovetailed. These bear on their inner ends two halves 29 of the neck-mold. These two halves 29 of the neck-mold are customarily bolted to the slides 28 and are so placed that when pressed against each other they are arranged to meet on a line drawn through the center of the guide-rods 6 7.

On the under side of the frame 27 and em-

bedded therein is a ring 30, capable of partial revolution by means of a handle 31, and in said ring 30 are cut two slanting grooves 32, through which extend bolts 33, depending from the slides 28, so that a partial revolution of the ring 30 will cause the slides 28 and halves 29 of the neck-mold to approach and recede from each other.

Projecting from one side of the frame 27 is an ear 34, through the center of which is an opening 35 for a purpose to be stated.

Rising from the table-top 1 is a rod 36, bearing slidable thereon a blow-arm 37, consisting of a sleeve 38, surrounding said rod 36, from which extends an arm 39, terminating in a cylindrical-shaped case 40. (See Figs. 2 and 3.) Centrally through this case 40 and vertically slidable therein is a pin 41, having an enlarged flat head and terminating in a cone-shaped lower end. Surrounding said pin 41 in said case is a spring 42, the normal tendency of which is to raise the enlarged flat head of the pin 41 slightly above the upper face of the case 40. The lower cone-shaped end of this pin 41 is arranged when the pin is set at its highest point to fit into a countersunk opening in the lower part of the arm 39. Extending from the countersunk opening just described to a point near the sleeve 38 is a cored opening 43. This cored opening terminates near the sleeve 38 in a cylindrical-shaped boss 44, into which is fastened a flexible air-tube 45, so the air may enter from the air-tube 45 and into the boss 44 through the opening 43 to the countersunk opening, which is normally closed by the conical head of the pin 41, influenced by the spring 42. This blow-arm 37 is slidable freely, as before stated, on the rod 36 and descends thereon of its own weight, but is supported by ear 34.

Across the table-top and centrally between the guide-rods 6 7 is cut a shallow groove, in which is freely slidable a plate 46, bearing the molds in which are formed the desired articles. These molds consist of the blank-mold 47 and the blow-mold 48. The blank-mold where it rests on the plate 46 is surrounded by a ring 49, integral with the plate, for the sake of keeping it accurately in place. This blank-mold consists of two parts—an upper part 50 and a lower part 51. The lower part 51 of the blank-mold is internally bored to form a cylindrical tube 52, in which is arranged to reciprocate vertically a plunger 53, usually having a hollowed-out upper face and designed to rise as high in said opening as the upper line of the lower part 51. The lower blank-mold 51 bears near its upper outer surface a flange 54, on which rests the upper half 50 of the blank-mold, whose internal configuration is such as to produce the correct design of blank for the formation of the article to be produced by this machine. This upper half 50 consists of two halves hinged together and held by any suitable or preferred means. The upper part of the

blank-mold 50 is counterbored a short distance to allow space for the entrance therein of the neck-mold 29. The plunger 53, herebefore described, is caused to reciprocate vertically in the blank-mold 51 by means of a piston-rod 55, which is attached at its lower end to a piston-head (not shown) working in a vertical cylinder 57, mounted on the floor of the frame of the machine and below the table-top 1. The piston-rod 55 has a short stroke, and the cylinder 57 receives compressed air as a motive power through a pipe 58, entering a valve-chest 59 of the ordinary pattern. On the side of the steam-chest 59 is a bracket 60, in the perforated end of which is mounted a horizontal rod 61. The upper end of the valve-rod 62 is pivotally attached to the rod 61. The rod 61 is moved upward and downward to operate the valve in the valve-chest 59 in the following manner: Depending from the cross-head 19 is a vertical rod 63 (shown in Fig. 7) and the lower end of which is slotted to inclose the free end of the rod 61. The slotted end of the rod 63 is provided with adjusting-screws 64, by which the effective length of the slot may be shortened or lengthened, as required, and is designed if too long to be allowed to pass through an opening in the platform of the machine. (Not shown.)

It will be seen from the foregoing that the movement of the cross-head 19, operating the valve of the cylinder 57, controls its operation.

The blow-mold 48 consists of a hinged mold the halves of which are held together in any preferred manner, having centrally mounted in its lower part a block 65, whose upper face will form the lower part of the mold in which the desired article is to be produced. The general internal configuration of the blow-mold is that of the finished article desired to be produced by the machine.

On the sides of the plate 46 are a pair of pins 66, adapted and arranged to move and operate a horizontal arm 67, extending from the collar 68 on the rod 36, so that as the plate 46 is moved transversely across the top of the pins 66 will encounter the lateral arm 67 and swing the blow-arm 37 into and out of operative position.

The operation of the machine is as follows: Air is supplied under pressure by means of the pipe 17 to the cylinder 10 on the under side of the piston, so that the plunger 20 and cross-head 19 are raised to the position shown in Fig. 1. The plate 46 is moved to the left and the upper half 50 of the blank-mold removed and a definite quantity of molten glass is poured into the cavity in the lower half 51 of the blank-mold above the plunger 53, and it may here be stated that this cavity may be adjusted by increasing or diminishing the vertical length of the plunger 53, so that by filling the cavity above the plunger even full with the top of the part of the mold 51 a definite quantity of glass is pre-

pared for the operation of the machine. The hinged upper portion 50 is then placed on top of the lower portion 51 and securely locked against opening. The plate 46 is then shoved to the position shown in Fig. 2, with the center of the blank-mold directly under the axis of the cylinder 10. The handle 16, operating the valve-rod 12, is moved by the operator, causing the cross-head and its connected parts to descend. The neck-mold is forced down until it rests on the counterbored portion of the blank-mold and is followed by the ring-mold 25, surrounding the plunger 20, and the cross-head 19 continuing its descent the parts rest in the position shown in Fig. 6. While this is taking place, the rod 63 is also forced down by the cross-head, and substantially at the same time that the plunger 20 completes its downward stroke the upper end of the slot in the rod 63 will encounter and press down the rod 61, which in turn operates the valve in the lower cylinder, allowing air to enter under the piston in the cylinder 57, which forces up the piston-rod 55, which passing through an opening in the top 1 and plate 46 raises the plunger 53 and forces the glass heretofore placed in the blank-mold up around the plunger 20 into the neck and rim molds until they are completely filled. It may here be noted that this raising of the charge of glass from below and forcing it into the neck and rim molds is a very desirable feature on account of the fact that it is an extremely difficult matter to cause the heavy sticky pasty mass of molten glass to enter the small neck portion of the mold rapidly enough to form the necessary beading around the top of the bottle. As soon as the plunger has made its descent the upper half 50 of the blank-mold is opened, the handle 16 reversed, admitting air under the piston in the cylinder 10, which raises first of all the plunger 20 from out of the mold, followed immediately by the rim-mold, and lastly by the neck-mold, the latter in its ascent raising the blank of molten glass, which as it leaves will cling in the neck-mold and the lower end of which will assume a long tapered appearance. The plate 46 is then moved to the left in Fig. 2, which was the first position described, bringing the blow-mold 48 directly under the axial line of the cylinder 10. In moving the plate 46 to the left one of the pins 66 will engage the lateral arm 67 on the collar 68, which will rotate the rod 36 and swing the blow-arm 37 around over the center of the neck-mold, as shown in Fig. 8. As soon as the mold is in the position just described the handle 16 is moved by the operator, allowing compressed air to enter above the piston in the cylinder 10, forcing down the cross-head 19, driving the plunger 20 down on the cap of the pin 41, which will open the valve in the blow-arm, allowing air to enter the interior of the blank suspended in the blow-mold, causing it to assume the configuration desired by the peculiar mold

used. As soon as the molten glass shall have cooled sufficiently the handle 16 is reversed, raising the plunger 20 from contact with the pin 41, and the plate 46 is moved to the position shown in Fig. 2, the mold opened, and the finished product removed.

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

1. In a machine of the class designated, the combination of a table, a mold-bearing plate sliding thereon, guide-rods rising vertically from said table, a vertical cylinder mounted on the top of said guide-rods, a cross-head and plunger adapted to be operated by a piston-rod operated by said cylinder, a two-part blank-mold, the upper portion whereof is provided with an internal configuration of the desired kind, the lower portion whereof is provided with a reciprocating plunger, a cylinder, piston-rod, and piston to operate said plunger in said lower portion of the blank-mold, a slotted rod depending from said cross-head arranged to operate by suitable mechanism the valve for said lower cylinder, substantially as shown and described.

2. In a machine of the class designated, the combination of a table, a mold-carrying plate slidable on said table, two molds mounted thereon, one whereof is a blank-mold and the other a blow-mold, vertical guide-rods rising from said table on either side of said sliding plate, a cylinder mounted on the top of said rods, a cross-head slidable on said guide-rods, a piston-rod and a piston in said cylinder to operate said cross-head, a blow-arm carrying a depressible valve adapted to swing over said blow-mold when the latter is centrally under said cross-head, mechanism operated by said sliding plate to swing said blow-arm, a cylinder mounted under said sliding plate, and mechanism mounted on said cross-head to operate the valve for said lower cylinder, substantially as shown and described.

3. In a machine of the class designated, the combination of a table and a mold-carrying plate slidable transversely across said table, a pair of molds mounted on said plate, guide-rods rising vertically over said table, a cylinder mounted on the top of said rods, a cross-head slidable on said rods, a piston-rod to connect said cylinder and cross-head, a cylinder mounted below said movable plate, a piston-rod operated by said cylinder at desired intervals, a plunger mounted in one of said molds adapted to be reciprocated by the action of said lower piston-rod, and means mounted on said cross-head to operate the valve of said lower cylinder, substantially as shown and described.

In testimony that I claim the above I hereunto set my hand in the presence of two subscribing witnesses.

JONATHAN HALEY.

In presence of—

C. P. HUMPHREY,
C. E. HUMPHREY.