June 21, 1932. W. LEDIG 1,864,023

AMPUL MACHINE

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Fig. 1

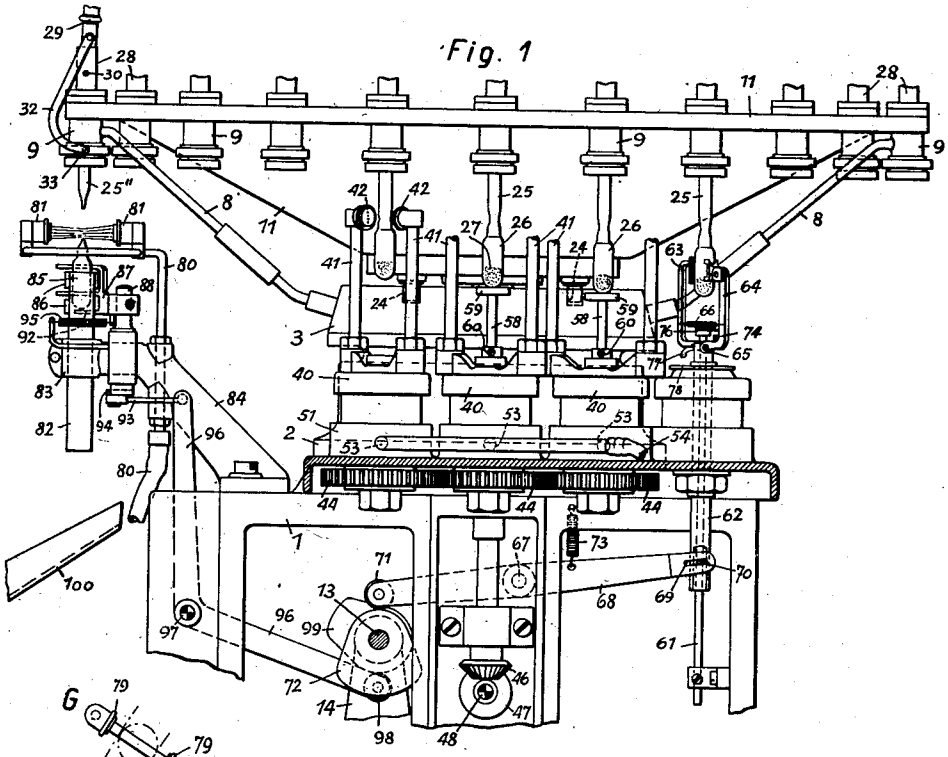
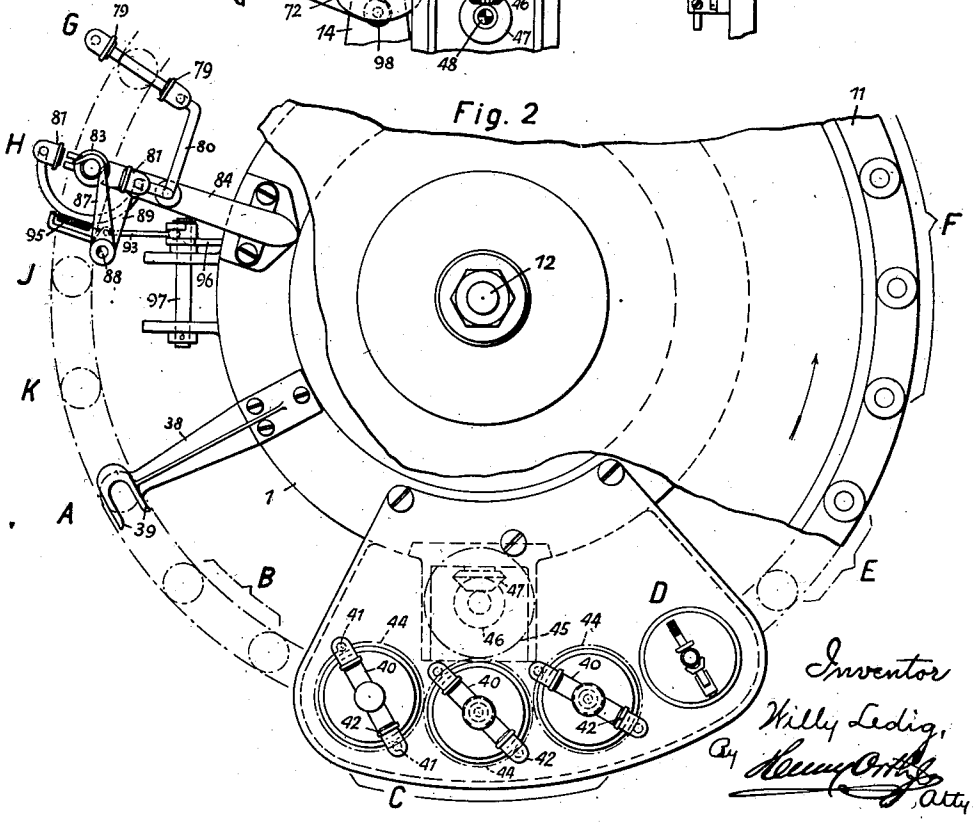


Fig. 2



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Fig. 3

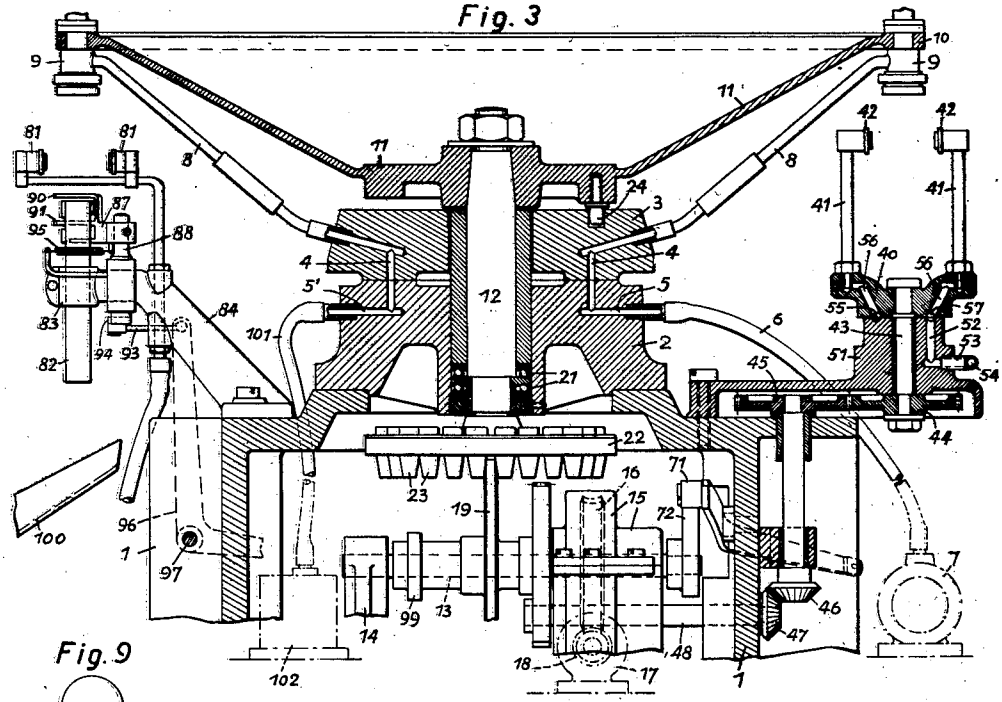


Fig. 9

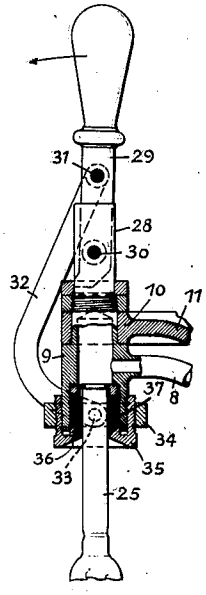
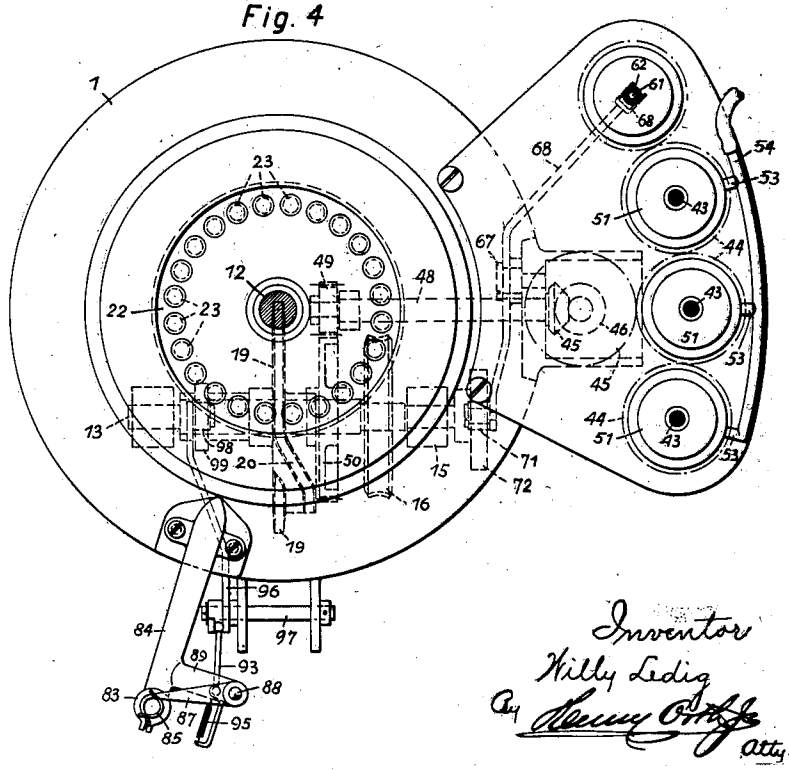


Fig. 4



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Fig. 5

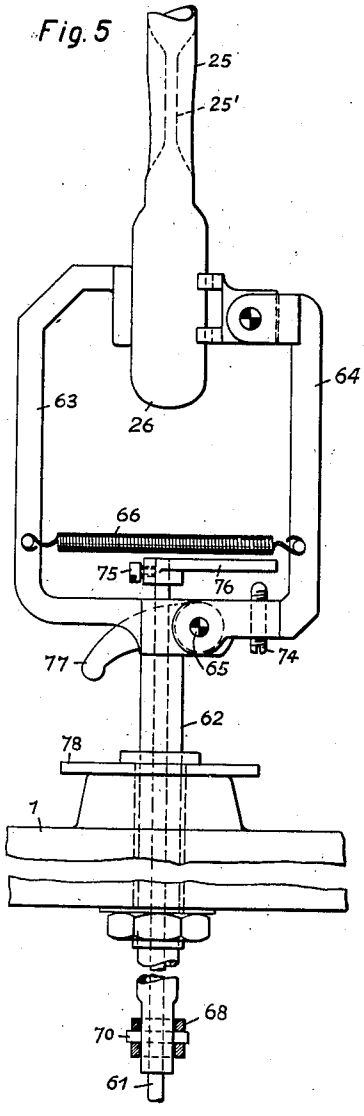


Fig. 6

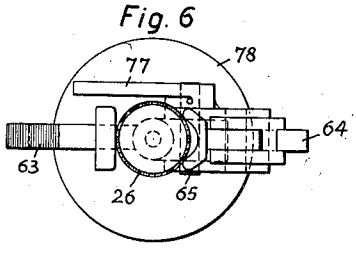


Fig. 7

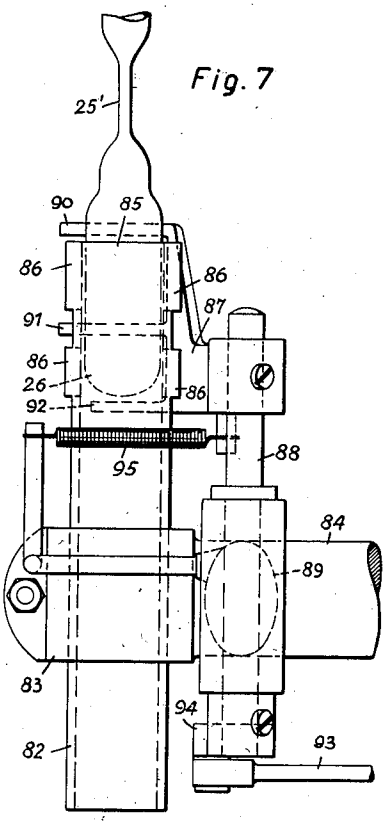
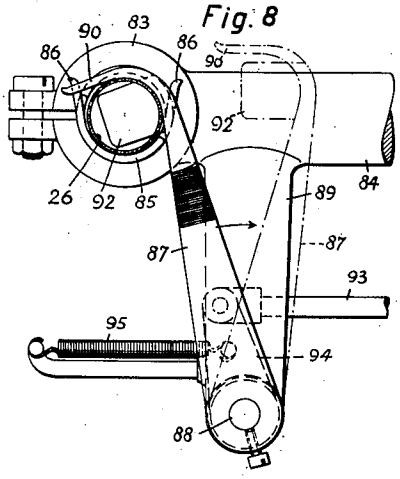


Fig. 8



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UNITED STATES PATENT OFFICE

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AMPUL MACHINE

Application filed June 14, 1929, Serial No. 370,900, and in Germany June 16, 1928.

My invention relates to a machine for sealing hollow glass blanks for ampuls, and similar hollow glass devices, and the object of the invention is to do this in a series of successive operations from blanks closed at the bottom, by moving blanks having a relatively wide mouth in a circular path step-wise from an insetting position to a heating position, to a drawing position, to draw down the blank to form a narrow neck, then to a position for exhausting the filled blank, then to a sealing and discharging position, to a residue discharge position and finally to the position for inserting a new blank.

The machine not only embodies an exhausting means but also means for other operations where the blanks are held by a suitable head with the closed bottom of the blank downward, heated by burners and drawn down only so far as to form a narrow neck for exhaustion. In this manner the holding portion of the blank is very simply formed and the blank can be rapidly heated without rotating it on its axis, by continually rotating burners.

The invention also comprises continuously rotating supports for oppositely positioned burners that rotate about the blanks to uniformly heat the blank in a ring zone below its upper portion held by the head.

Since the blanks before evacuation still have an open neck and hang vertically until finished, their contents, whether powder, liquid or paste, previously inserted will neither be spilled, nor harmed by heat when drawing the neck.

Special holding means during sealing and for discharging the finished ampuls are provided.

Details of construction will hereinafter be fully described and specifically claimed.

Referring to the drawings—

Figure 1 is an elevation of so much of the machine as is necessary for an understanding of the invention.

Fig. 2 is a plan view.

Fig. 3 is a vertical section of the machine, showing mainly the driving means.

Fig. 4 is a plan view of the lower part of the machine.

Fig. 5 is an elevation, and

Fig. 6 a plan of the neck drawing devices.

Fig. 7 is an elevation, and

Fig. 8 a plan view of the mechanism for holding an ampul during sealing off and for discharging it.

Fig. 9 is a section of one holding head of the machine.

Centrally of the stationary machine frame 1 is mounted a rotary disc valve of known construction, and consisting of a stationary valve body 2 and a movable valve member 3 sliding thereon. The movable valve member 3 has a number of ports 4 that successively register with ports 5 in the stationary member 2 and that are connected each by a conduit 6 to exhausting pumps 7.

The ports 4 in the movable valve member 2 are connected by pipes 8 with box-like holding heads 9 mounted in a laterally projecting flange 10 of an inverted hollow conical carrier 11. This carrier 11 is mounted on a central shaft 12 loosely passing through the valve parts 2 and 3 and serves to step this carrier 11 and the heads 9. For this purpose serves a main driving shaft 13 mounted in bearings 14, 15 of the lower machine frame. The bearing 15 is hollow and contains a worm wheel 16 fixed on the main driving shaft 13. The wheel 16 meshes with a worm 18 mounted on the shaft of an electromotor 17. On the main driving shaft 13 is further mounted a step driving disc 19 with a laterally bent off portion 20. The central shaft 12 is supported by roller bearings 21 and has fixed on its lower end a disc 22 provided with a number of circularly arranged rollers 23, the number of them corresponds to the number of the holding heads 9 or working positions. The disc 19, 20 enters between the rollers 23 in such manner that by rotation of it a stepwise movement is imparted to the conical carrier 11 and the holding heads 9. The upper valve member 3 is connected by members 24 to the smaller lower end of the conical carrier 11, so that also the upper valve member 3 is stepwise moved.

The upper open ends 25 of the ampul blanks 26 are clamped in the heads 9 in a vertical

position, the blanks being previously filled with the required quantity of contents 27.

The clamping of the upper ends 9 of the blanks in the heads can be accomplished by any suitable means. In the example shown each holding head 9 is provided at its upper end with a bolt 28 to which is linked at 30 a hand lever 29. To the latter is linked at 31 a fork shaped swing lever 32, the lower ends of them are connected by pivots 33 with a ring 34. Screwed into the ring is a sleeve 35 provided with an inner conical face 36 which is determined to compress a rubber sleeve 37 to engage the upper end 25 of the blank 26. When the lever 29 is swung outwardly in the direction of the arrow (Fig. 9), the sleeve 35 with its conical face 36 is pressed downwardly, whereby the rubber sleeve 37 is released. The open upper end or neck part 25 of the ampul blank 26 may then be easily inserted into the rubber sleeve 37. By swinging back of the hand lever 29 the sleeve 35 with its conical face 36 compresses the rubber sleeve 37, so that the latter will tightly grip the neck part 25 of the inserted blank.

In order to readily insert the blanks in vertical position in the heads, there is mounted on the frame 1 a stationary arm 38 having a forked end 39 that engages the slightly contracted portion of the blank that connects the body portion 26 with the upper holding or neck portion 25 of the blank. The inserting position is indicated at A, Fig. 2, and is followed by one or more idle positions B to permit, if necessary, sufficient time to complete the clamping of the blank in the head before the blanks reach the heating positions C for softening the neck portions of the blanks.

There are several of such burner pairs, three being shown.

Vertically beneath the heating positions of the blanks are supporting members each having a disc shaped body 40, two gas pipes 41 arising from the body 40 and two burner nozzles 42 arranged at the upper ends of the gas pipes. The two nozzles of a supporting member are directed toward one another.

The supporting members are mounted on vertical shafts 43 mounted in the machine frame 1, and each shaft 43 carries at its lower end a gear wheel 44. One of the three gear wheels 44, preferably the middle one, is driven by a gear wheel 45, which drives the three intermeshing gear wheels 44 and is itself driven by mitre gears 46, 47, a shaft 48 and gear wheels 49, 50 actuated from the main driving shaft 13 of the machine to continuously drive the same.

The pairs of burner pipes or tubes 41 also rotate in unison with the gear wheels 44 through their supporting members 40, and assume the position shown in Fig. 2 at the moment of the stepping of the body 11 that carries the blanks. The blanks can thus pass into and out of position between the burner tubes 41 and their burners 42. Each of the rotating disc shaped bodies 40 is supported by a stationary body 51, which is provided with a boring 52. All the borings 52 are connected by fittings 53 with a main gas supply conduit 54. The upper end of the borings 52 terminates into a ring grove 55 of semi circular cross section. Each of the rotating bodies 40 has two borings 56. The upper ends of the latter are connected with the burner tubes 41, whilst the lower ends of the borings 56 terminate into a ring grove 57 which forms with the other ring groove 55 a ring channel of circular cross section. During the rotation of the upper disc shaped bodies 40 the burner tubes 41 and burners 42 are continuously supplied with gas.

During the dwell in revolving movement of the blanks the burner tubes 41 rotate about a positioned blank, so that the necks of the blanks in the regions of the burner nozzles are heated and softened by the flames. At the second burner position there is on the gas tube support a preferably non-rotating rod 58 having on its upper end a plate 59 for supporting the lower end of the blank the neck of which has sufficiently shortened to allow contraction of the neck. The third burner position has a similar rod 58 and plate 59, but advantageously slightly lower, to still further contract the neck. The height at which the two supporting plates are set is adjustable for various lengths of ampul blanks, or similar hollow glass containers by means of set screws 60.

Following the third heating position C is a position D where there is a vertical rod 61 adjustable as to height by a set-screw 61. On this rod slides a sleeve 62 the upper end of which, see particularly Figs. 5 and 6, carries a jaw 63 fixed thereto and a co-operating jaw 64 hinged on a pin 65. A spring 66 connecting the two jaws normally holds the movable jaw 64 in closed position.

The sleeve 62 and the jaws 63, 64 carried thereby are moved downward during each dwell in the revolution of the blanks and during the stepping movements of the blanks is moved upward.

This is attained by means of a two-armed lever 68 mounted on a pivot 67 and connected at one end to the sleeve 62 by a pin 70 in the sleeve passing through a slot 69 in the lever, while the other arm of this lever carries a roller 71 urged against a cam 72 by a spring 73. The cam 72 is mounted on the main driving shaft 13 of the machine.

On the movable jaw 64 is an adjustable screw stop 74 that strikes against a stop 76 adjustably fixed by a set screw 75 on the stationary rod 61 at the end of the upward movement of the sleeve, so that the movable jaw opens in its upper position to allow a blank to come between the jaws. Both jaws 63 and

64 have such an angular position relative to the path of the blanks as to allow the blanks to enter between the open jaws in their upper position. During the following downward movement of the jaws they close upon the blank and draw it downward to contract the softened end of the blank to a small exhausting diameter 25, Fig. 5.

On the movable jaw 64 or on its pivot 65 is a lug 77 that strikes a stop 78 when the sleeve 62 is retracted and opens the jaw 64 to release the drawn blank, now having a narrow neck portion 25, for further movement.

During further stepping of the blank the drawing jaws 63, 64 are moved upward and opened for the reception of the next blank.

The drawn blanks are then passed through one or more steps, as at E, for cooling the drawn neck preparatory to evacuation, and then are stepped past a large number of positions at which the blanks are connected by the slide valve 2, 3, to the exhausting pump 5 and exhausted to a high degree. During the travel of the blanks through the air exhausting positions F, the blanks, provided their contents will permit it, may be additionally heated if desired.

At the position G, following the air exhausting positions, the drawn neck 25 is melted off, leaving a closed stub 25″ in the head 9. This is done by a pair of burner nozzles 79 supplied with gas through a supply pipe 80, by which the drawn neck is heated.

In the following position H, are two burner nozzles 81 also supplied from the gas conduit 80. This burner seals off the neck 25 and finishes the ampul. In order that this shall properly take place, there is at the position H a tube 82 in vertical axial alinement with the blank, Figs. 7 and 8, and held clamped in a head 83 of an arm or bracket 84 extending from the machine frame 1. About one-half of the upper end of the tube, (at the approaching side of the tube 82), is cut away, leaving approximately a semi-cylinder 85 whose lateral margins are somewhat flared at 86. About the level of this tube portion 85 is a lever 87, pivoted at 88 in a projection 89 on arm 84 to swing horizontally.

This lever 87 extends into two prongs 90 and 91 at its free end which, when the lever 87 is moved against the tube 82 encloses the lower ampul portion of the blank, and in connection with the tube portion 85 securely holds the ampul during sealing off. On the lever 87 is a plate 92 which in the position shown in full lines in Fig. 8, supports the ampul as it is being melted off from the remainder of the blank, and prevents its premature fall.

By means of a rod 93 which is connected to arm 94, fixed at the pivot 88, the lever 87 is withdrawn against the action of a spring 95, and the prongs 90 and 91 and supporting plate 92 are withdrawn from the tube 82, and ampul 26, now sealed off, drops by gravity through the tube 82 onto a chute 100 Fig. 1, and is taken away for packing or storing.

The movement of the rod 93 is realized by a crank lever 96 mounted on a bolt 97 of the frame 1 and provided with a roller 98 resting on a cam 99 of the main driving shaft 13.

After the position H the heads 9 are stepped to the position J, at which the upper ends of the blanks left in the heads can cool.

Finally, at the end position K the cooled upper ends or residues 25″ of the blanks are released from their clamping heads 9 by pressure of air led into the interior of the heads 5. For this purpose swinging outwardly are the hand levers 29. The residues 25″ are then removed in any way, for instance the part 4 of the movable valve member 2 is in position K in communication with an air pressure pump 102 by means of a part 5 and a conduit 101.

I claim—

1. In a machine for exhausting and sealing ampuls and similar hollow glass articles in which the ampuls are stepped in a circular path and automatically evacuated; securing heads from which the blanks depend vertically, pairs of burner nozzles between which the blanks are stepped, for softening the necks of the blanks and vertically movable drawing tongs to draw the softened necks to small diameter for exhaustion means to exhaust the blanks, means to seal the blanks, and discharge means to discharge the finished ampuls.

2. In a machine for exhausting and sealing hollow glass articles having a plurality of heating zones; pairs of burner nozzles at each heating zone, means to continuously rotate the pairs of nozzles about a vertical axis and means carrying the articles and timed to step the articles between the nozzles of a pair to enter the frame between the nozzles.

3. In a machine for exhausting and sealing hollow glass articles, rotatable burner supporting members having a plurality of upwardly extending arms, a burner vertically mounted on each arm, said burners having their nozzles directed toward the axis of the supporting members and said hollow glass articles adapted to be stepped in a position coaxial with each rotatable supporting member.

4. In a machine for exhausting and sealing hollow glass articles, the combination with rotatable burners for heating and drawing the articles, of means for supporting the bottoms of the articles during heating to limit the lengths of the draw, said supporting means comprising a plate extending upwardly from the bearing axis of the rotatable burners and coaxial with the said article.

5. In a machine as described, means holding ampul blanks and means for stepping said blanks to successive operating positions, burners for softening the necks of the blanks,

and successively lower vertical stationary and adjustable supports on which the bottoms of the blanks rest during heating, said supports controlling the length of the finished ampul.

6. In a machine as described, means for holding a circular series of hollow glass blanks, means for stepping the same into operative positions, drawing tongs at one of said positions comprising an upright jaw and a pivoted jaw, means to vertically move the jaws, a stationary stop and a pin on the vertical jaw to engage the stop on vertical movement thereof to open the jaws for entrance of a blank, a second stationary stop and a lug on the movable jaw to engage the latter stop to open the tongs at the end of their downward drawing movement.

7. In a machine as described, means at the sealing off position of a blank comprising a tube whose upper end is longitudinally cut away to form a stationary jaw, a pivoted arm forming a movable jaw and cooperating with the stationary jaw to hold the lower end of the blank during sealing off, and means to operate said arm, the finished ampul discharging by gravity through the tube when the arm is withdrawn.

8. In a machine as described, means at the sealing off position for a blank, comprising a vertical tube whose upper end is longitudinally cut away to form a stationary jaw and the vertical edges at the cut-away portion flared outwardly, a pivoted arm having a forked end that cooperates with the stationary jaw to hold the severed ampul and a supporting plate on the arm to enter said tube and support the bottom of the severed ampul, and means to operate said arm.

9. In a machine for sealing ampuls, a series of circularly arranged blank holding heads, means for stepping the series of heads, vertical, continuously rotating pairs of gas burners in the paths of said blanks, adjustable supports for the lower ends of the blanks during heating, drawing tongs automatically engaging and drawing the necks of the blanks, evacuating means, burners for softening the drawn, evacuated blanks, burners for sealing off the ampuls, means for holding and discharging the finished ampul and means for discharging the residual portion of the blank.

10. A machine for sealing ampuls provided with their contents, comprising a series of blank holding heads, means for stepping the heads, means for exhausting the heads and ampuls therein, gas burners past which the ampuls are stepped, means for drawing the softened necks while exhausting, means to seal off the ampul, means to discharge the filled sealed ampul, and means to blow the residual portion of ampul from the head.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

WILLY LEDIG.