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APRIL 27, 1943.

BY A. P. C.

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APPARATUS FOR MANUFACTURING HOLLOW GLASS ARTICLES

Filed Jan. 24, 1941

Serial No. 375,868

11 Sheets-Sheet 1

Fig. 1

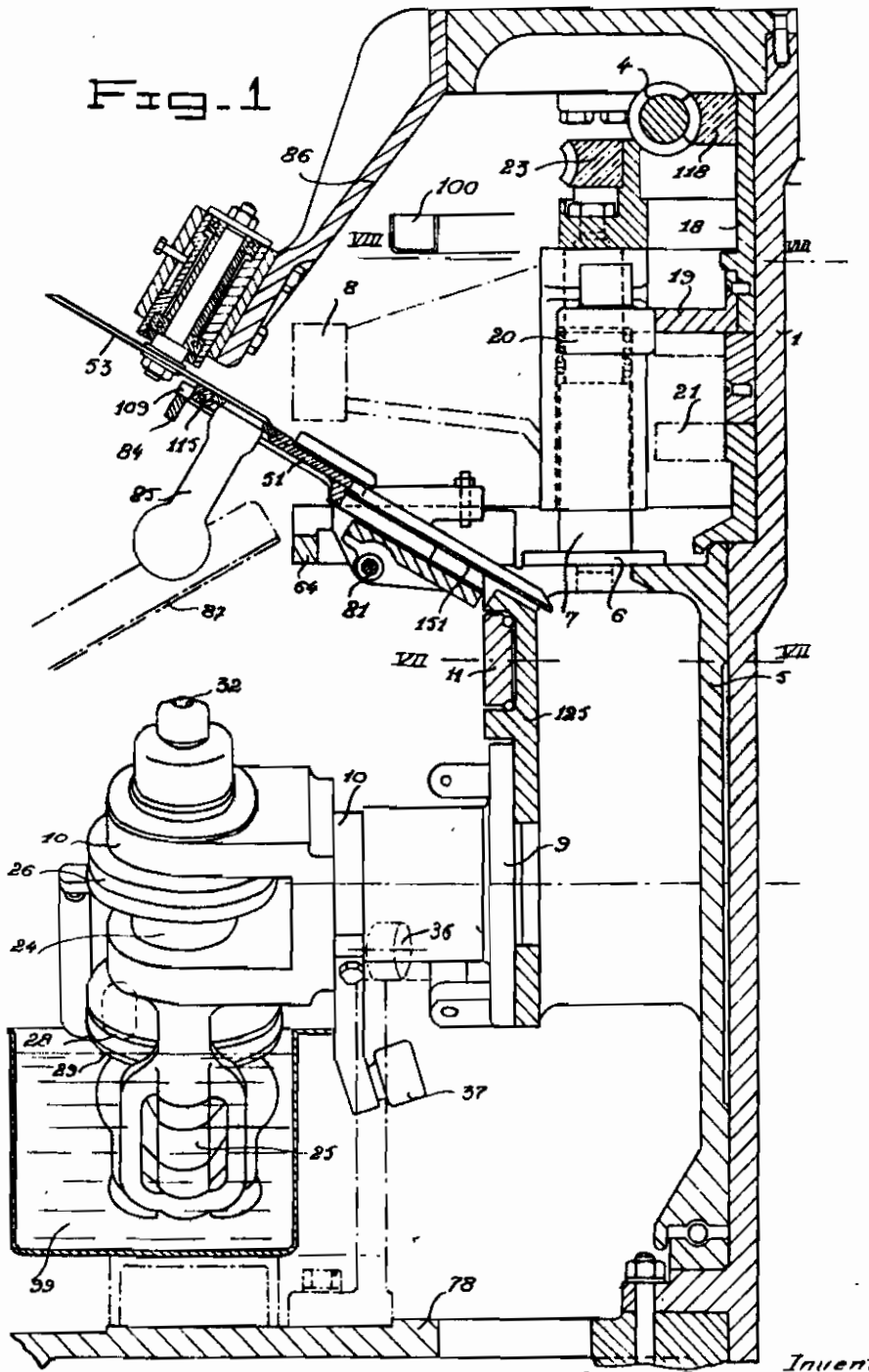

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Fig. 2

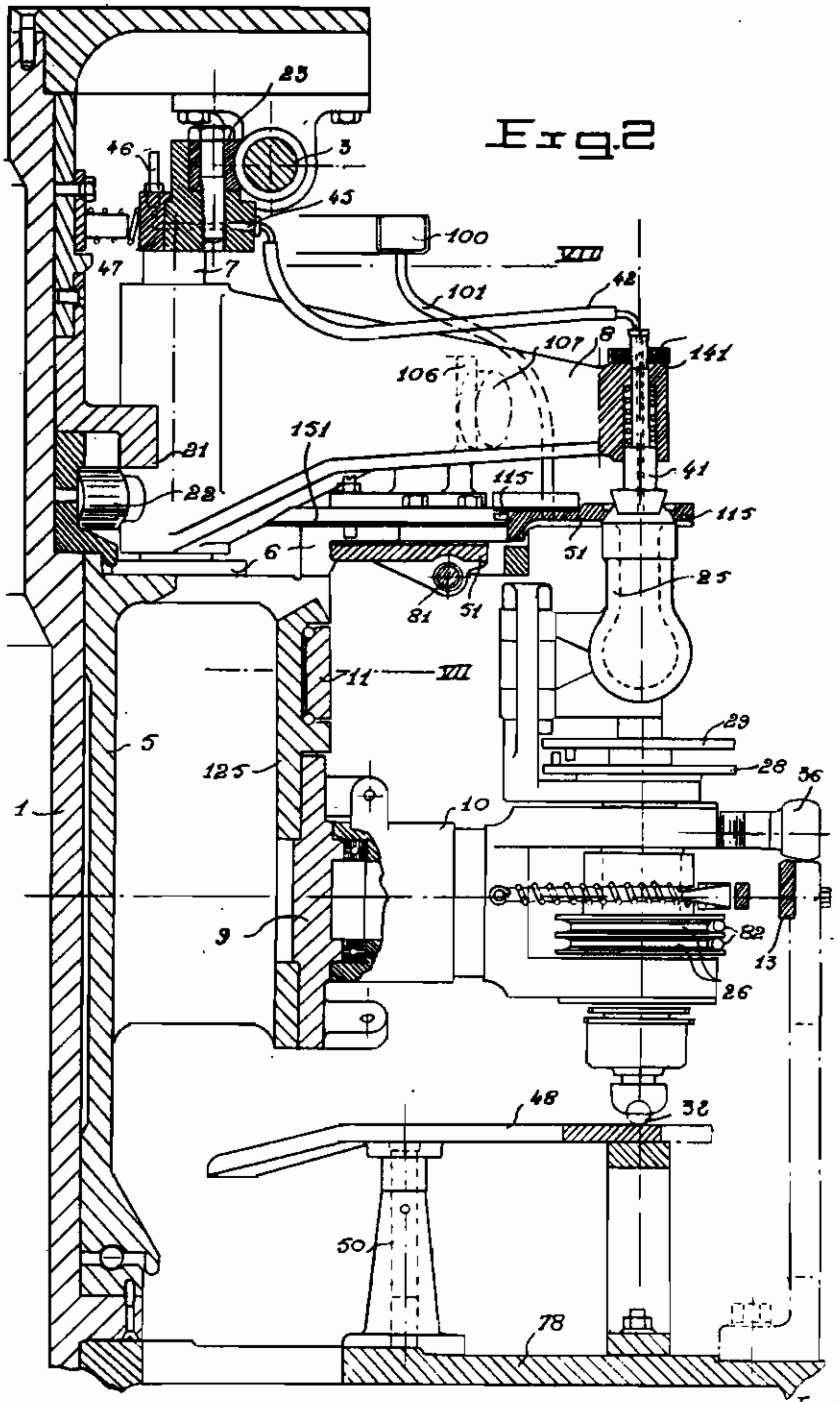

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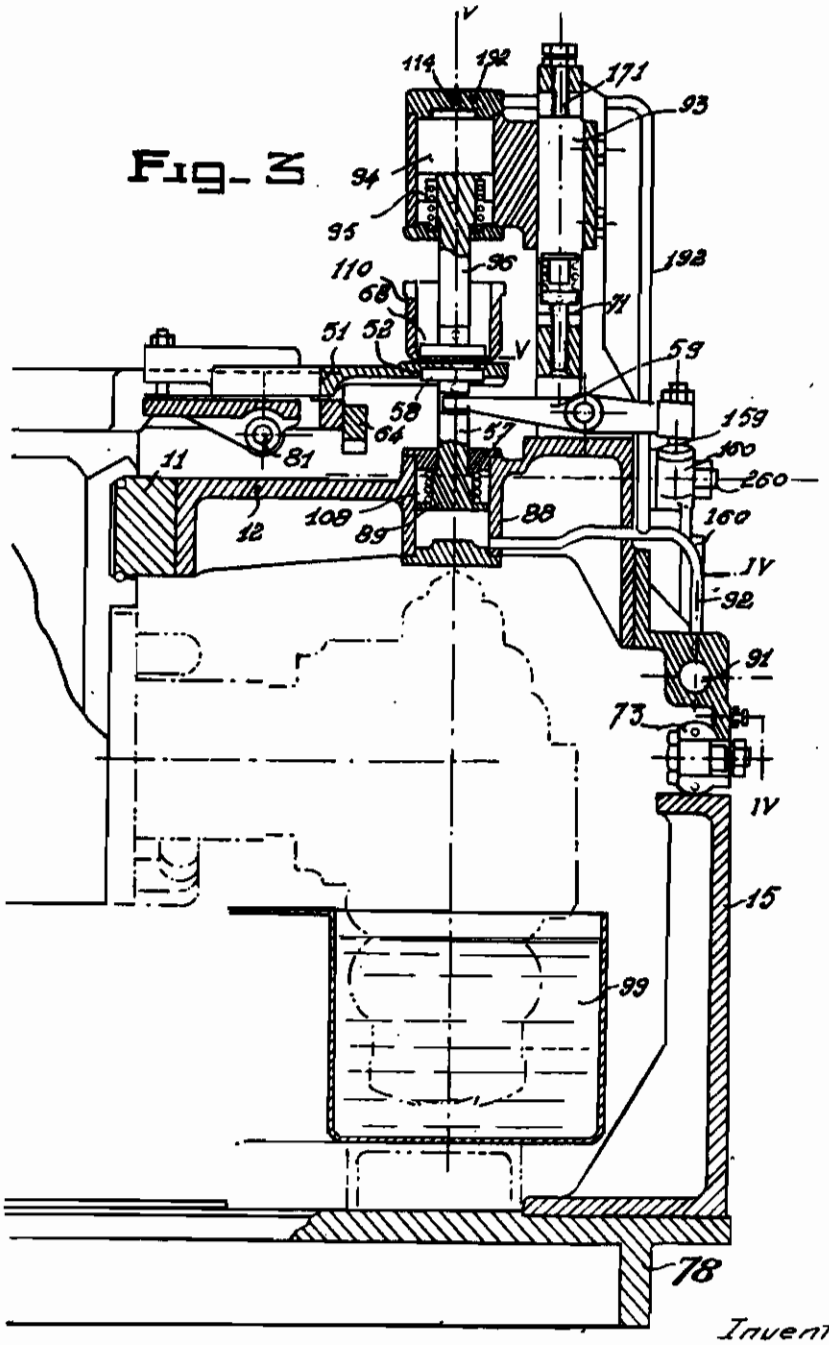
Fig. 3



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Serial No.
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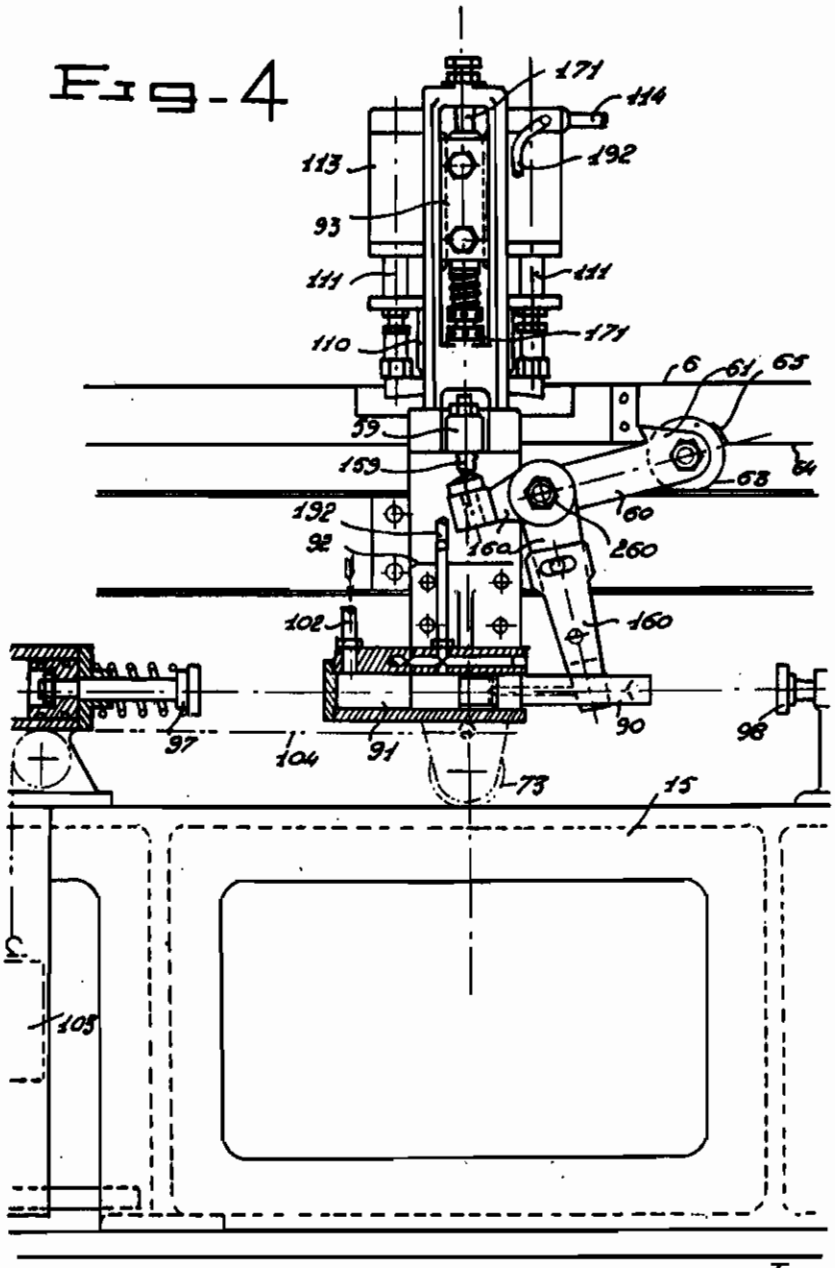
Fig-4



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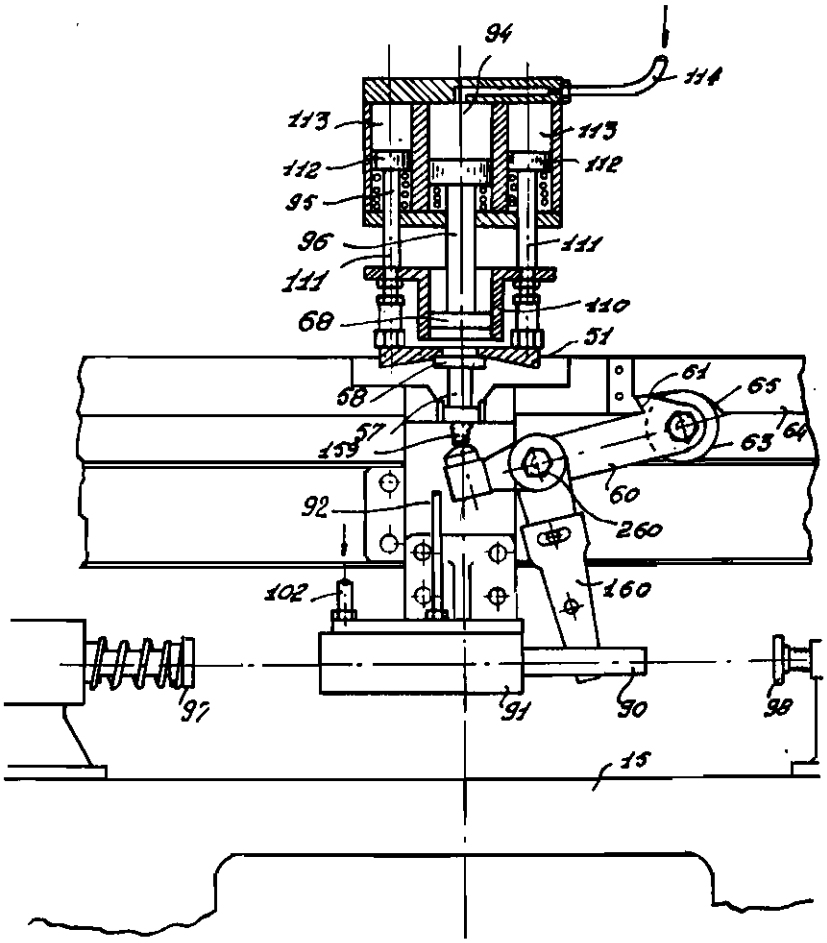

Fig-5

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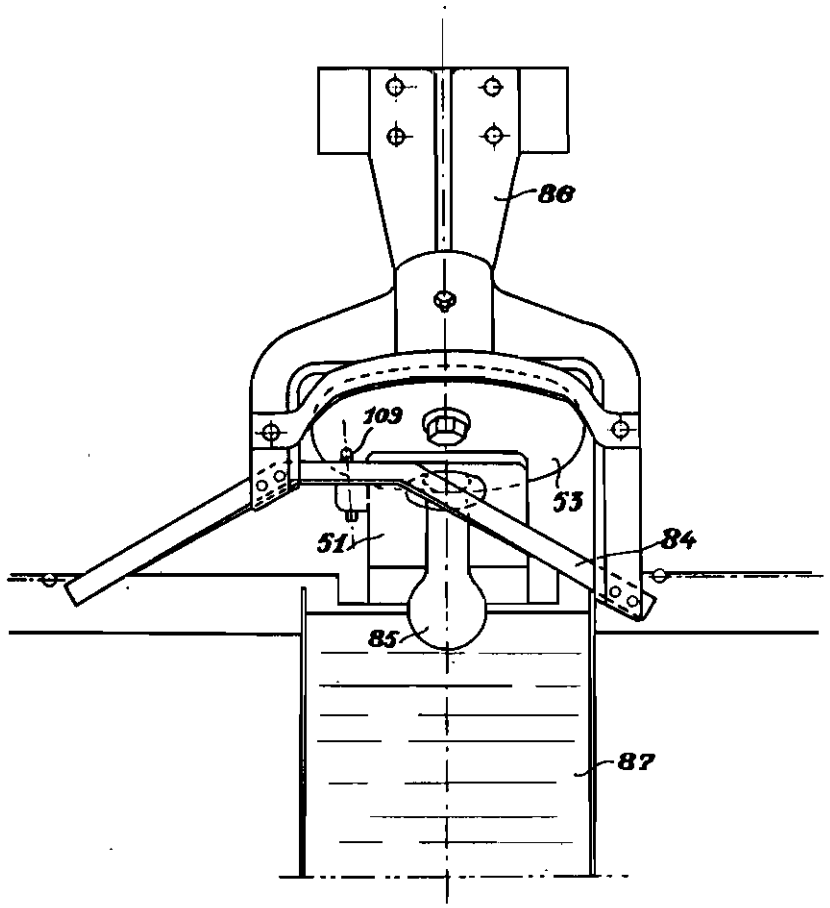

Fig. 6

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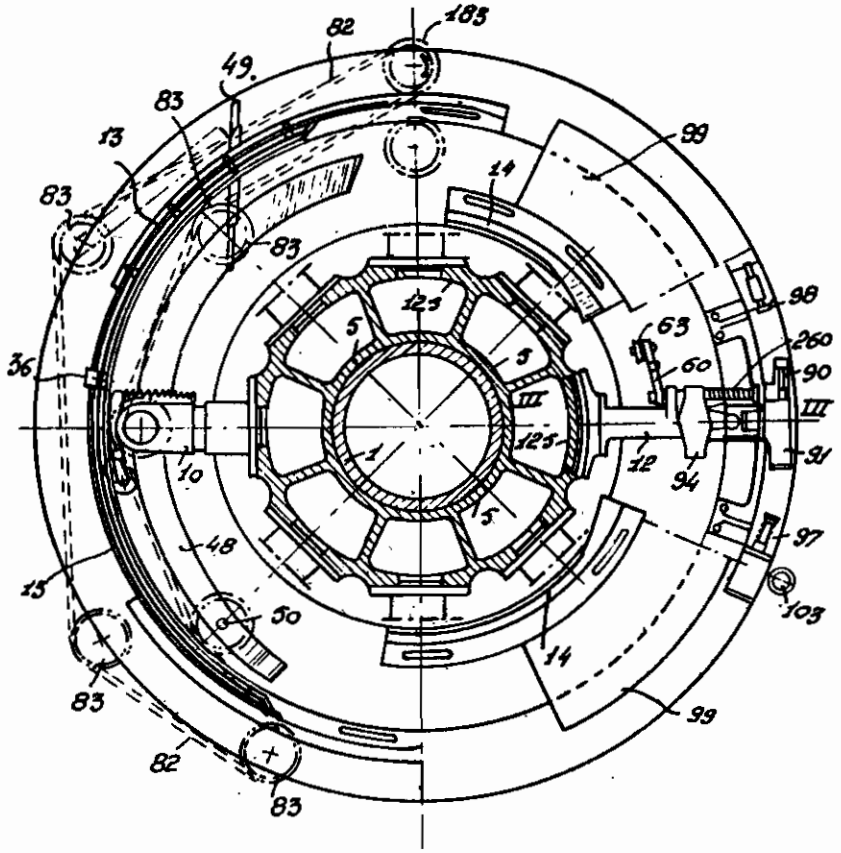

Fig-7

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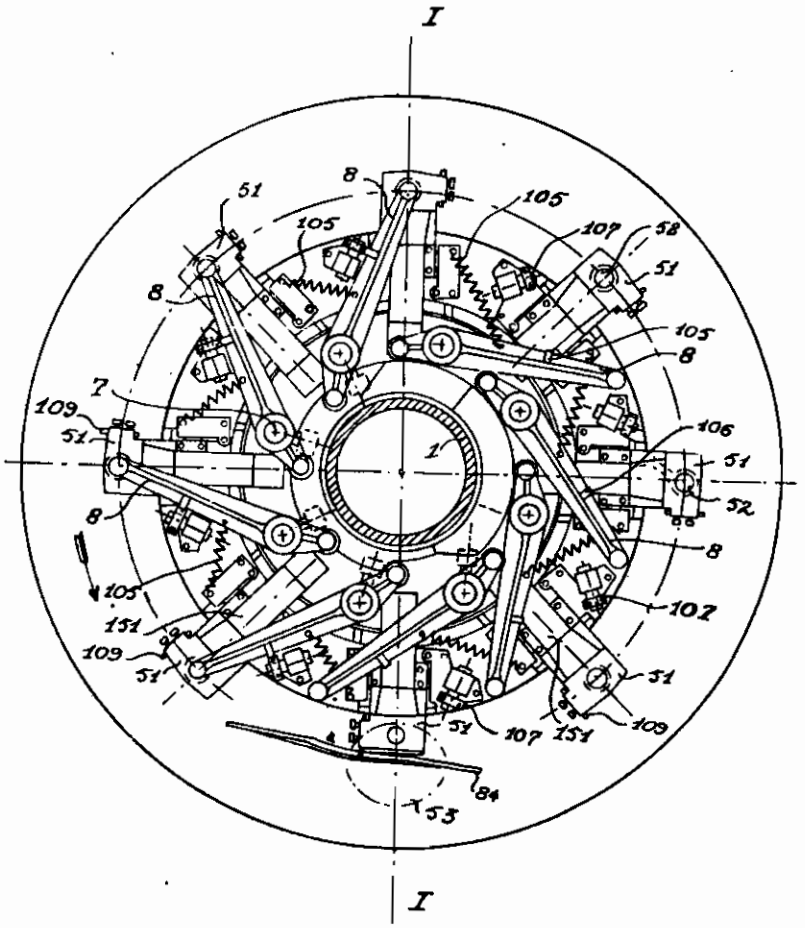

Fig. 8

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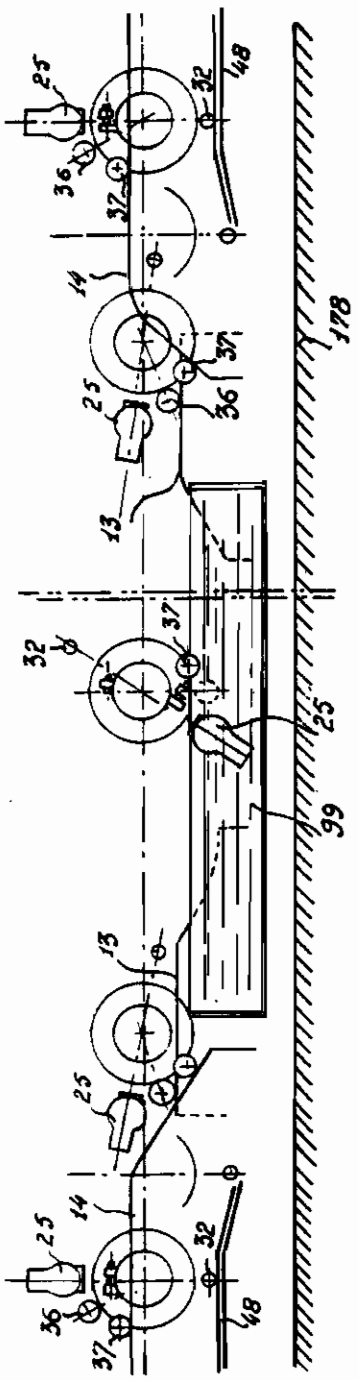
Fig 9



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375,868

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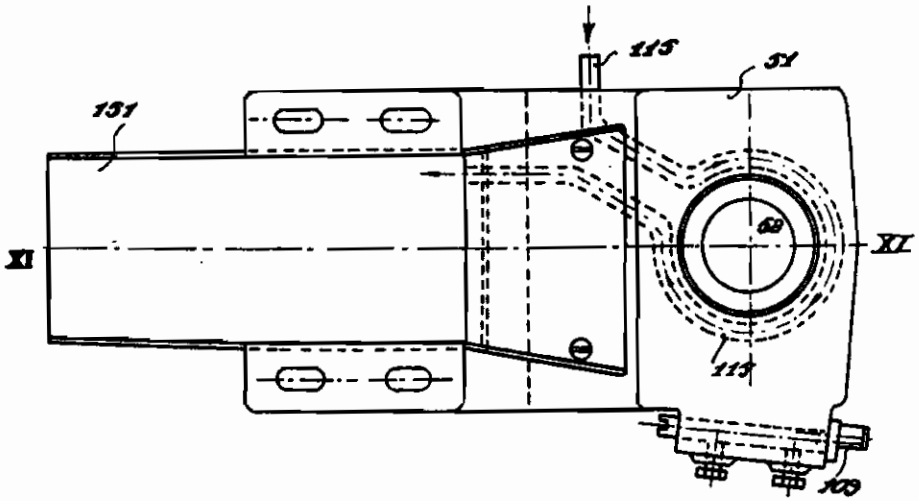
Fig. 10



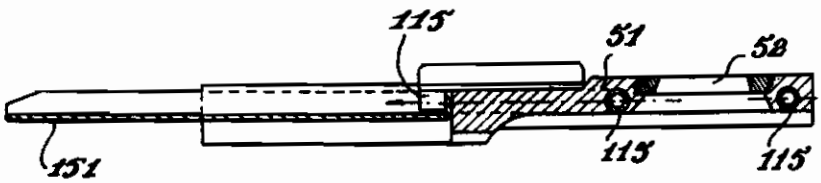


Fig. 11

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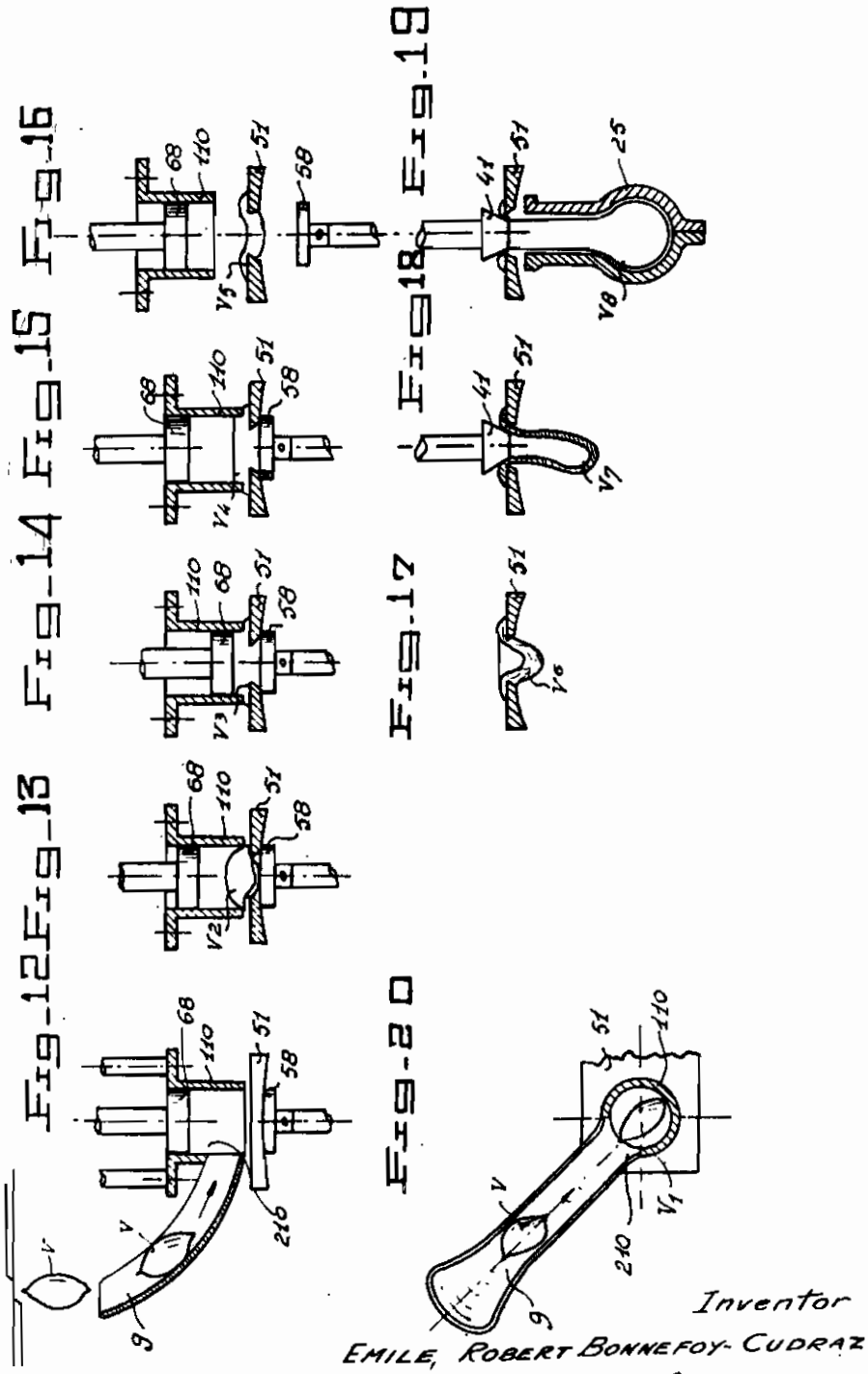

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ALIEN PROPERTY CUSTODIAN

APPARATUSES FOR MANUFACTURING HOLLOW GLASS ARTICLES

Emile Robert Bonnefoy-Cudraz, Courbevoie, France; vested in the Alien Property Custodian

Application filed January 24, 1941

The invention relates to apparatuses for the manufacture of hollow articles from portions of glass or of another vitreous matter distributed, when plastic on perforated working tables.

These portions of glass are delivered from the furnace by a feeder supplied with shears working at a regular rate according to the output of the feeder to cut off portions of the glass of given weight.

The two regions of the portions of glass which undergo the action of the scissors grow cool at their contact. They become less fluid as the remainder of the portion of glass. It follows that these parts are harmful to an accurate formation of the hollow body which is to be obtained. It is therefore necessary to leave them in the waste of the manufacture.

But, till to-day, nobody attended to remedy this disadvantage, which is already serious in the manufacture of flasks, and becomes much more troublesome in the manufacture of lamp-bulbs or similar thin walled articles and necessitates then to throw aside the articles containing these cooler parts.

The present invention has for its purpose to remedy this disadvantage; it relates to an apparatus of which efficiency is higher than that of the similar apparatuses known till now, and which avoids the presence of the said cooler parts in the finished articles.

To this effect, one of the objects of the invention is to provide for a movable part adapted for the service of machines comprising a series of work-tables rotatable about a common axis, said part being adapted for receiving each separate mass of glass and for centering the same on the orifice of one of the work-tables in such a manner that the two cooler regions of the mass will be situated outside of said perforation for securing the passage to waste of the parts cooled by the scissors of the feeder.

Another object of the invention is to adapt specially the control of the movable centering part for the service of machines with a series of movable work-tables by binding the displacements of this part to those of the work-tables.

Another object of the invention is to combine the movement of the centering part for the glass portions with that of the member which temporarily supports the glass portion and stops up the perforations of the work-tables under the control of the binding device between the centering part and the work-tables.

Other objects of the invention will appear in the course of the following description, of an embodiment of the invention, with reference to the annexed designs wherein.

Fig. 1 is a part of the vertical section along the axle of the apparatus, along I—I of Fig. 8.

Fig. 2 is the other part of the same section.

Fig. 3 is another section through the axis of the apparatus along III—III of Fig. 9.

Fig. 4 is a corresponding front view and a partial section along IV—IV of Fig. 3.

Fig. 5 is a similar view as the preceding with a partial section along V—V of Fig. 3.

Fig. 6 is a front view of Fig. 1.

Fig. 7 is a horizontal section of the apparatus at a reduced scale, along VII—VII of Figs. 1 and 2.

Fig. 8 is also a horizontal section, on the same scale, along VIII—VIII of Figs. 1 and 2.

Fig. 9 is a diagrammatic view, indicating in evolution, the guides of the apparatus and their function.

Fig. 10 shows a plan view of a detail of Fig. 1.

Fig. 11 is a vertical section along XI—XI of the preceding.

Figs. 12 to 19 are diagrammatic axial sections of the reception members, preliminary conformation and blowing of glass parts, showing the different aspects of working of these parts.

Fig. 20 is a diagrammatic plan view corresponding to Fig. 12.

The same reference numbers have been used in these figures to indicate the same pieces.

Around the hollow shaft 1, bolted on a horizontal framework 78 (Figs. 1 and 2) is arranged the cylindrical sleeve 5, with its outer annular wall 125. On this column is fixed the plate 6, on which at 81 the work-tables 51 are articulated. This plate also carries the vertical shafts 7 constituting the supports of the blowing apparatuses 8. The external case 125 of the sleeve 5 also carries horizontal shafts 9 to the same number as the vertical shafts 7, and these horizontal shafts form the axes of rotation of rotary rocking supports 10 of the moulds.

The arm 12 (Fig. 3) is fitted on the same case 125 by means of a cylindrical collar 11, supporting the obturating device for the orifices provided in the tables, and the steering and thinning device of the glass parts.

Suitable columns are fixed on the framework 78, and support the cams 13 and 14, on which work in turn the different rollers of the rotary rocking supports of the moulds. On this framework is mounted a vertical support 15 (see Figs. 3 and 4) forming on its upper part the rolling way for the roller 73 of the steering, thinning and stopping device.

Around the fixed vertical column 1 is mounted a cylindrical crown 18 which carries rolling tracks 19 and 21 of the rollers 20 and 22 of the movable blowing apparatus. A wormwheel 118, secured to the crown 18, permits the rotary adjustment of this latter with respect to the column 1 by the worm 4.

A wormwheel 23 of ring form, fixed on the secondary vertical shafts 7, transmits the movement of the worm 3 and rotates the cylindrical crown which carries the plate 6.

The rocking supports 10 for the moulds are mounted on the horizontal shafts 9. They comprise, as well known, cleat plates 28 and 29, arms terminated by rollers 36 and 37, and extremity rollers 32. As these dispositions have not a direct connection with the present invention, they will not be described. The rotation of the moulds is driven, when necessary, by ropes 82, running on rope pulleys 26, keyed to the shaft 24 of the supports, which are outwardly steered by the guide-pulleys 83. One of these pulleys 183 is moved by a motor (not shown) to assure the movement.

Each movable blowing apparatus 8 comprises a blowing head 41 which is resiliently mounted and provided with regulation discs 141 (Fig. 2). This head is connected by a flexible pipe 42 to a conduit 45 provided in the notched ring 23 and from there to a pipe 46 drawing compressed air. The rollers 20 and 22 assure: the first 20, the swinging movement of the blowing apparatus about the shaft 7, whilst the roller 32, its lowering.

It is profitable that the cams tracks 19 and 21 on which the rollers are moving should be made in two pieces sliding the one on the other, in order to allow the ruling of the amplitude of the blow arm. The centring of the blowing head to the work-table is secured by abutments 107 jointed to the table and fingers 105, adjusted on the arms 8.

Each finger 106 comes into contact with the corresponding abutment 107, under the action of the spring 105 fastened respectively to the arm 8 and to the plate 6. The abutments 107 are made in form of rollers mounted on an eccentric spindle finishing an axle. In this way, it is possible, by rotating this spindle, to regulate exactly the centering of the head in its position of work (Fig. 8).

The rollers 38 and 37, of the rotary rocking supports 10 for the moulds, work on the cams 13 and 14 of suitable shape.

Another cam 48, the extremities of which form inclined planes, guides the extremity ball of the mould-carrier. This cam 48 can be displaced around a fixed axle 50 (Fig. 7) and set to the required position by a lever 49.

The circular plate 6 formed at the upper part of the sleeve 5—125 carries work-tables 51, equal in number to the blowing apparatuses. Each table is pierced by an orifice 52. Each table 51 is each in one with a slab 151 which lengthens it towards the axis of the apparatus (Figs. 1, 10 and 11).

Each table carries a roller 109. When this roller is rolling on the guide 84, the table is rocking. By the rotation of the plate 6 the collar of the bulb 85 formed under this table comes progressively into contact with a cutting wheel 53, carried by a fixed arm 86 in one with the shaft I (Fig. 6). When this collar is cut, the bulb falls into an inclined channel 87 which secures its evacuation from the apparatus. Each roller 109 is mounted on an eccentric spindle terminating an axle which assures the required position by rotating the axis.

It was seen before, that the arm 12 supports the obturing mechanisms for the orifices, the thinning and steering mechanisms of the portion of glass. The obturating mechanism (Figs. 3, 4 and 5) consists of a pneumatic cylinder 88, where a piston is moving 89, in one with a rod 57 which ends an obturation head 58 secured to a lever 59. Another lever 80, keyed to shaft 260, has on his end a ratchet 61 always in contact with the cam 64 formed by the under edge of the plate 6. This cam is provided with notches 85 in equal number as the blowing apparatuses. The shaft 260 bears on the end a cranked lever 160 of which descendant branch is in connection with rod 90 of distributor 81 which permits by the pipe 92 to send compressed air under the piston 89 which rules the obturation head 58. This cranked lever 160 bears on the upper branch an abutment which is leaned against the termination abutment 159 of the lever 59.

The steering and thinning mechanisms of the glass mass are supported by a block 93 elastically mounted on the arm 12.

The guide mechanism of the mass of glass includes a gutter *g* (Fig. 12) enlarged on his upper part, the lower extremity clearing on the periphery of a cup 100 (Figs. 3, 4, 5, 12 and 20). The cup 110 is fastened to the rods 111 of two pistons 112 movable in the cylinders 113 fixed on the block 93. A shunt 192 taken on the feeding pipe 92 of the cylinder 88 which drives the obturating mechanism of the work-table permits the arrival of the compressed air to each cylinder 113.

The thinning mechanism of the portion of glass comprises a pneumatic cylinder 94 fastened on the framework 93 between the two cylinders 113, a piston 95 sliding in the cylinder 94, a thinning mass fastened on the extremity of the rod 96 of the piston 95, at 68, and abutments 171 which can be regulated, permitting a correct regulation in height of the block 93 and afterwards of the mass of thinning. A canalisation 114 permits the arrival of compressed air to the cylinder 94. It is ruled by a distributor (not shown) directed by the mechanism of the shears of the feeder which feeds the apparatus with portions of glass.

The operation of the apparatus is as follows:

A feeder (not shown) is synchronously put in action with the apparatus of the present invention. He gives a portion of glass of a definite weight each time the pawl 61 of the arm 60 is engaged in the notch 65 of one of the tables and the movable arm 12 is thus bound with one of the tables which rotates it around the vertical fixed shaft I. The rotation of the movable arm 12 produces simultaneously the rising of the obturating head 58 in the orifice 52 of the table 4 and lowering of the cup 110 and its gutter *g* on the table, owing to the work of the distributor 91, which lets into the cylinder 88 and the cylinder 113 the compressed air coming by the pipe 192. This air operates thus the piston 89 and the pistons 112.

It must be noted that as soon as the glass mass coming from the feeder arrives by the gutter *g* on the obturating head 58 of the orifice 52 from the table, the herein before described but not represented distributor operates the valve mounted on the canalisation 114 and produces the admission of the compressed air on the upper part of the piston 95 in the cylinder 94.

The action of the compressed air stops in the

cylinder 94 as soon as the before said distributor no more operates the valve of the canalisation 114. The piston 95 rises under the effect of its antagonistic spring (Fig. 5) and carries with him the rod 96 with the thinning mass 68.

At the same time the rod 90 of the distributor 91 comes into contact with the regulable abutment 98, which throws back the rod 90, thus cutting the admission of compressed air to the cylinders 88 and 103 and bringing them in communication with the atmosphere. The cylinder 88 being so at the exhaust position, the obturating head 58 gets down automatically under the action of the spring 108 which acts the piston 89 to bring it into the low position. The same happens to the cylinders 113, and the pistons 112 get up automatically carrying with them the rods 111, the cup 110 and the gutter *g*.

Owing to the movement of the rod 90, the arm 160 is carried away and produces the disengaging of the pawl 81 from the notch 85. This disengaging frees the arm 12 from the table and a counterpoise 103 coupled to this arm by the cable 104 (Fig. 4) takes it back to the contact of the opposed damper abutment 97. The displacement is eased by the rolling of the roller 73 on cam 15. The arm 12 is brought back to its initial position by the return spring of the damper abutment 97.

The orifice 52 being freed, the glass mass can, in the following phase, flow through this orifice. Then the blowing apparatus is acting. By the effect of the return spring 105 the arms 8 of the blowing apparatus come in contact, by the abutments 106, with the stop rollers 107 which assure their correct centering over the work-tables.

Fig. 9 shows in evolution the plan of the cams 13 and 14 on which the rollers 36 and 37 of the rocking supports of the rotating moulds 25 are rolling, and the plan of the cam 48 on which the ball 32 is circulating. On this figure is shown too the container 99 in which the moulds are turned over after their opening for cooling. The opening and the closing of the moulds are ruled by the action of the pawl plates 28 and 29 as known.

The Figs. 12 to 20 show the manner of formation of a bulb which is as follows:

The glass mass V delivered by the feeder falls into the gutter *g* which brings it at V^1 into the cup 110 by the cutting 210. The enlarged form of the upper part of the gutter and its junction with the cup 110 remove the influence of a possible delay of the working of the shears of the feeder, because the glass mass always falls sooner or later into the gutter and thus arrives into the cup 110 of which part very important is. It increases the efficiency of the apparatus because it assures the correct placing of the glass mass on the work-table 51. Owing to the cup the glass mass is always disposed in such a manner that its two terminations which have received the action of the shears of the feeder remain outside of the orifice of the work-table. In this way one avoids the defects which could be produced in the bulb if one of the said extremities which are cooler as the remainder of the glass mass owing to its contact with the shears of the feeder would find itself above the orifice of the table and would bear the blowing and moulding operations. As the obturating head 58 has shut the orifice of the work-table 51, the mass inclines to extend at V^2 and to fill the orifice of this table (Fig. 13). The thinning head 68, while going down, flattens at V^3 the glass mass (Fig. 14) and drives the parts of glass who underwent the cooling action of the shears of the feeder back to the edges of the opening 52. The head 68 then rises and frees the mass V^4 which remains flat on the table 51 (Fig. 15). The obturating head 58 then goes down and frees the orifice of the table in same time as the cup 110 rises. (Fig. 16). The two thinning and obturating heads being removed from the table 51, the glass mass V^6 tends as a result of its weight, to flow through the orifice of this table (Fig. 17). This mass descends under the action of the blowing produced by the head 41 coming in position above the opennig of the table and in contact with the glass mass. The latter lengthens to V^7 (Fig. 18). The mould corresponding to the interested work-table then rises, the roller 37 approaching a suitable inclined plane of the cam 14 (Fig. 9). The mould closes afterwards around the parison V^7 owing to the fact that the ball 32 meets an ascendant inclined plane of the cam 48. As known, this ball is in one with a threaded rod of which ascendant movement produces the closing of the mould by rocking of its two halves by the interposition of pawl plates 28 and 29. The raised and closed mould turns around the axis of the perforation of the corresponding table as driven by the endless cable 82 meshed with the grooves of the pulleys 26. The bulb V^8 is formed by the blowing which goes on (Fig. 19). As soon as a bulb or a hollow article is finished, the mould is opened by the fact that the ball 32 runs on a descendant inclined plane of the cam 48 and is there rocking as the roller 37 meets a suitable inclined plane of the cam 14.

The revolving knife 53, which is mounted on a fixed position, separates the finished bulb from its socket which is formed by the mass of glass remaining on the table. For this purpose, this table rocks up owing to the passing of the roller 109 on the inclined cam 84 (Figs. 1 and 6). This rocking draws progressively the upper part of the table closer to the knife. After cutting of its collar, the finished bulb 85 is received in the lower gutter 87 which clears it out of the apparatus. The glass waste let on the table, which contains the two ends of the glass mass is straight cleared too on the slab 151 which is in prolongation to the table 51 owing to its inclination. The waste falls between the walls 125 and 5 of the central column of the apparatus till its stand. The evacuation of the water used for the cooling of the work-tables and flowing in the condult 115 of these tables is made too by the slab 151 between the two walls of the central column 5—125 (Figs. 10 and 11).

The apparatus according to the invention may, of course, be used for the manufacture of other hollow glass articles.

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