

**No. 668,223.**

**Patented Feb. 19, 1901.**

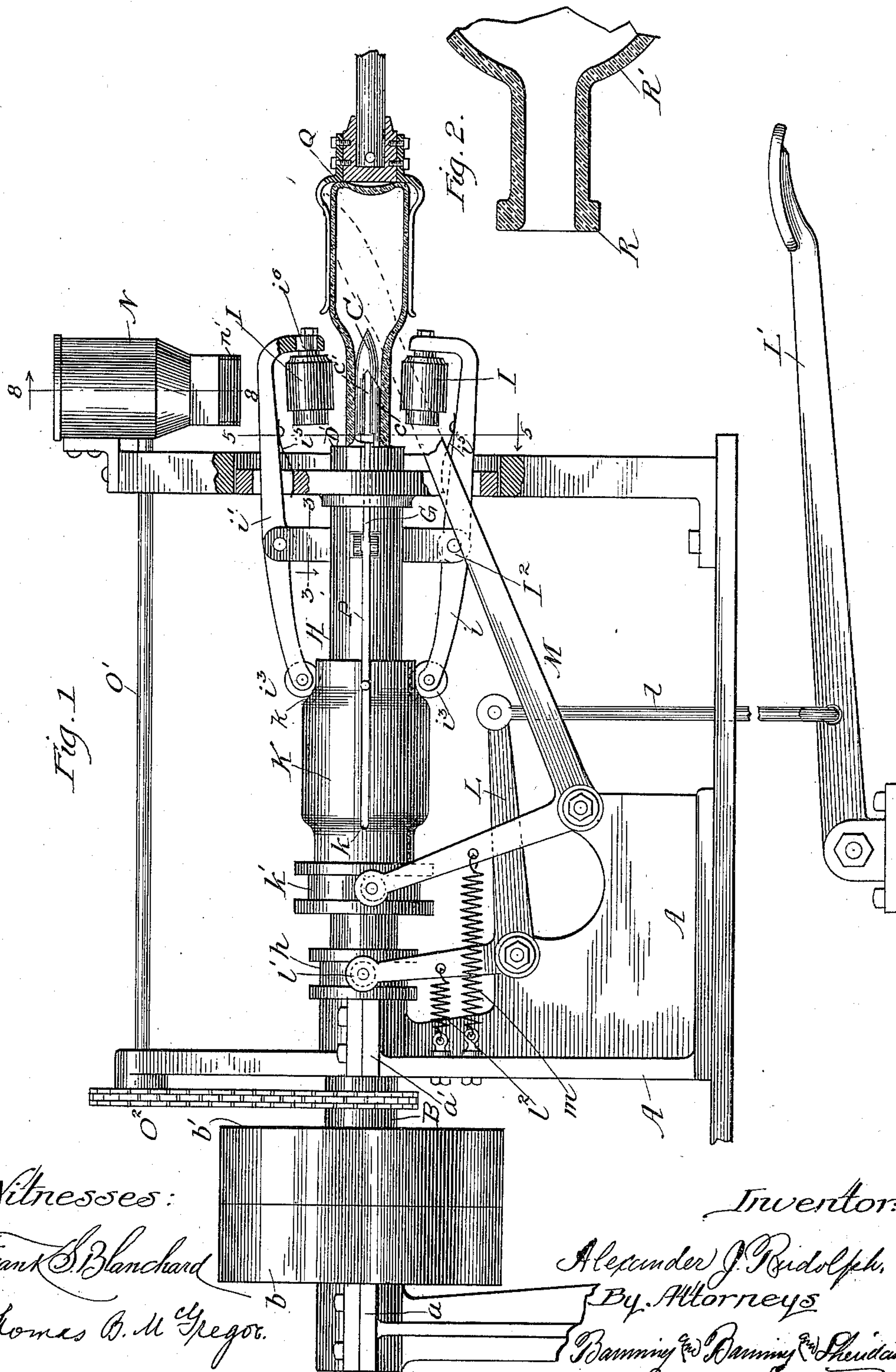
**A. J. RUDOLPH.**

# MACHINE FOR FORMING BOTTLE NECKS.

(Application filed Dec. 8, 1898.)

(No Model.)

**3 Sheets—Sheet 1.**



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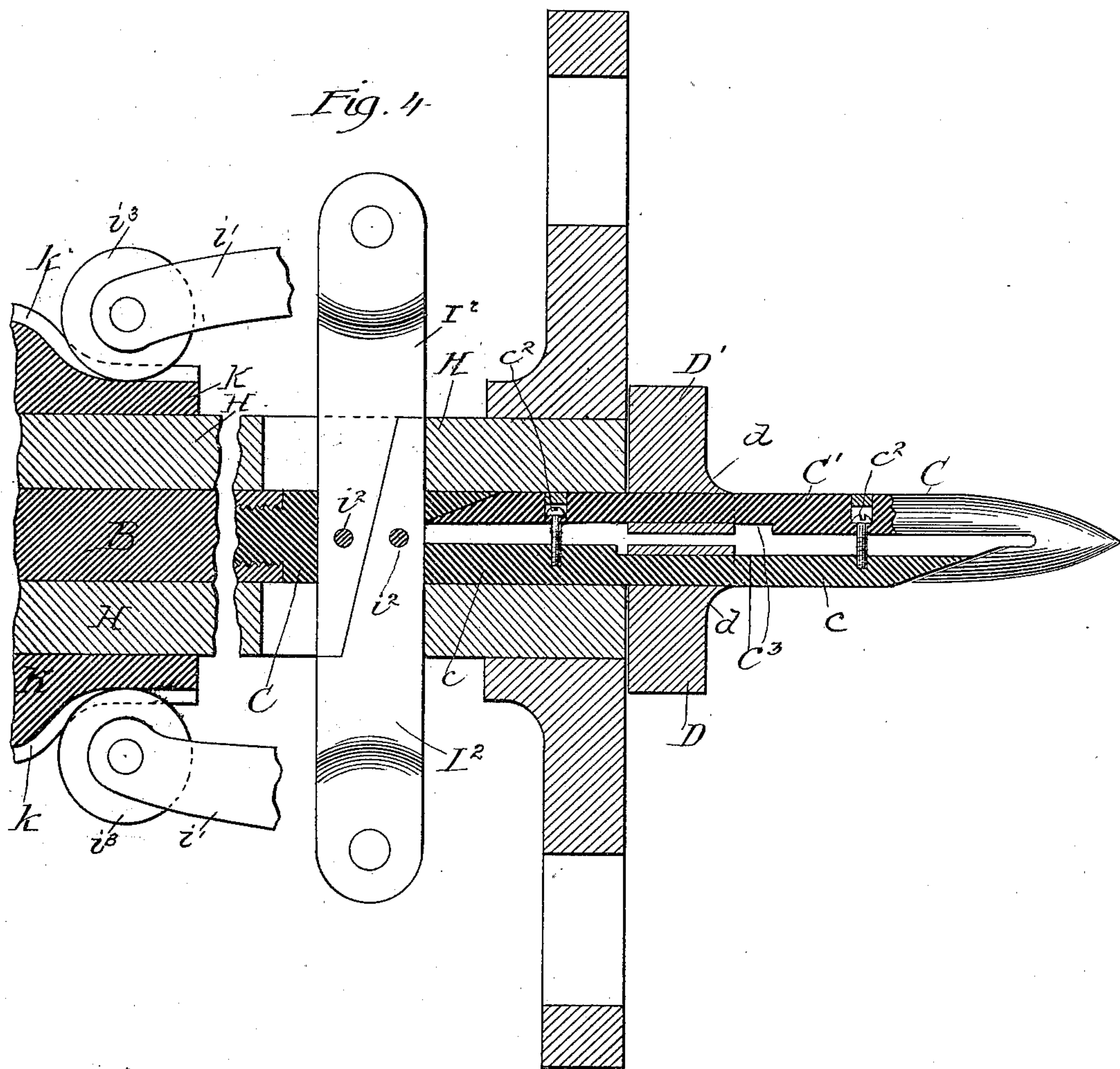
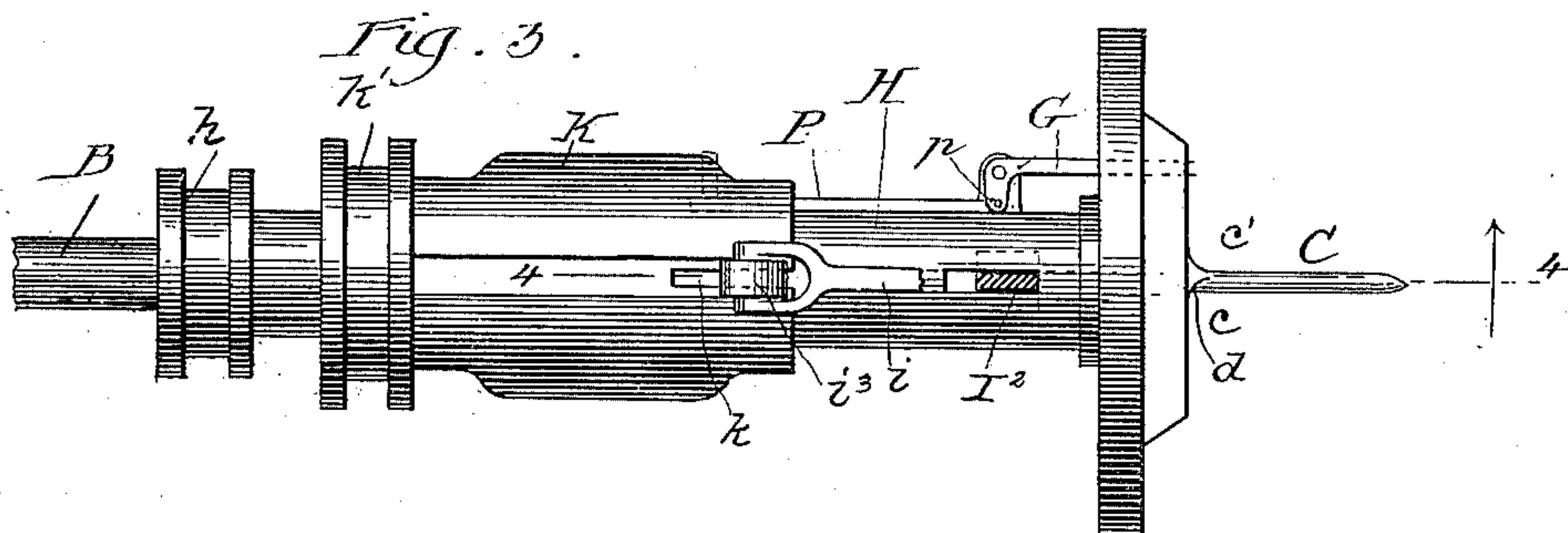
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MACHINE FOR FORMING BOTTLE NECKS.

(Application filed Dec. 8, 1898.)

(No Model.)

3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 5.

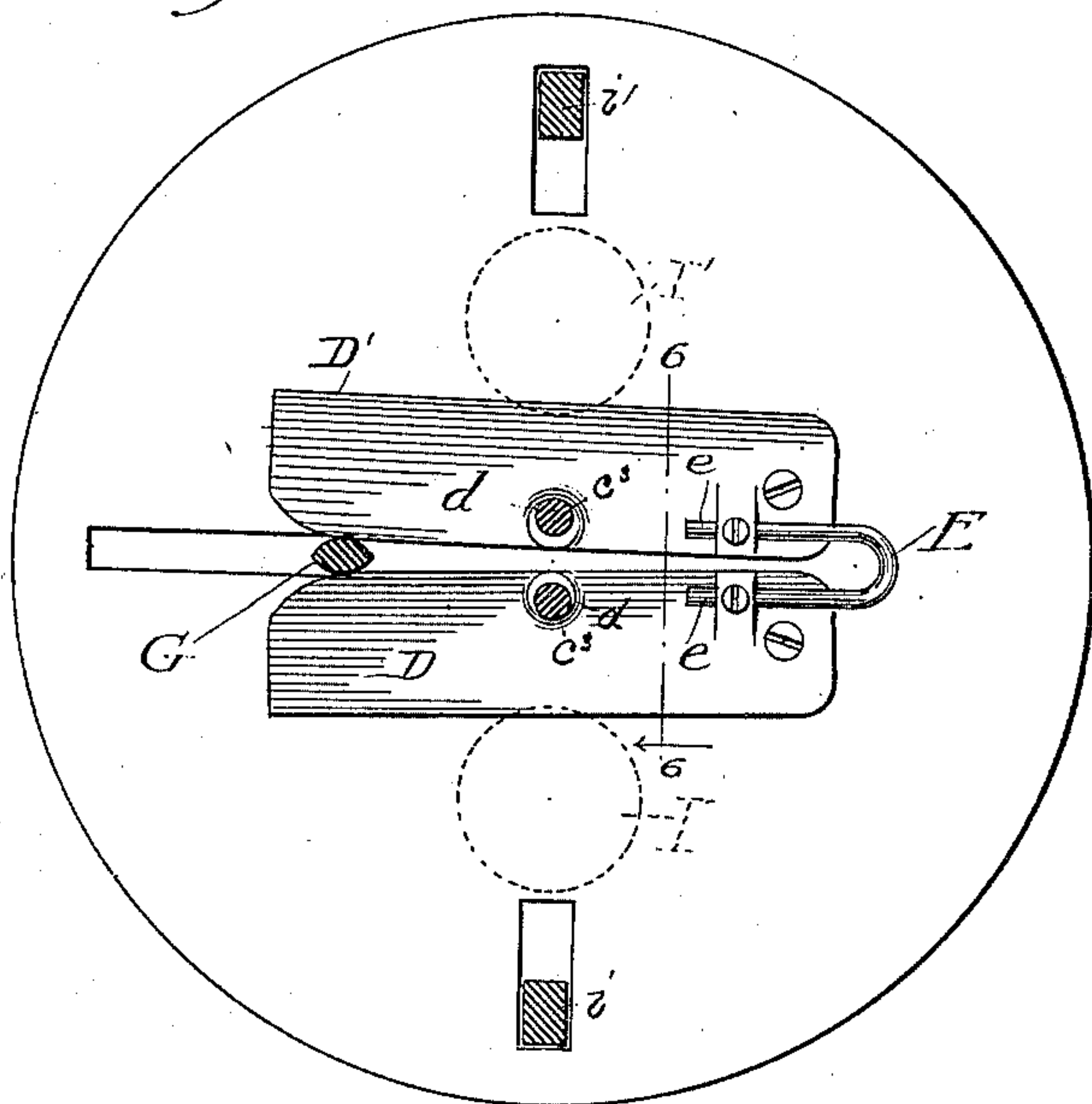


Fig. 6.

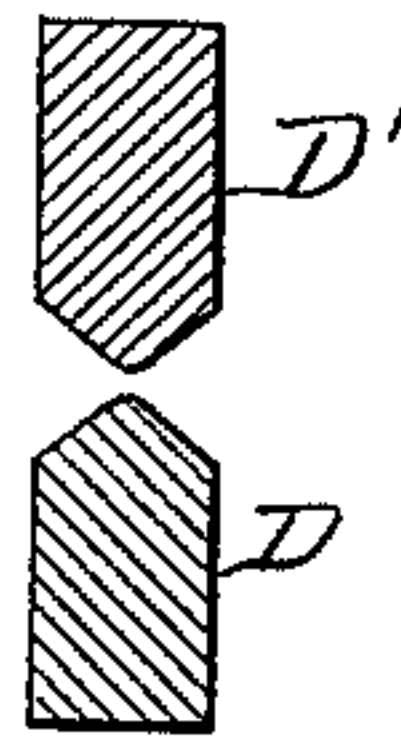


Fig. 8.

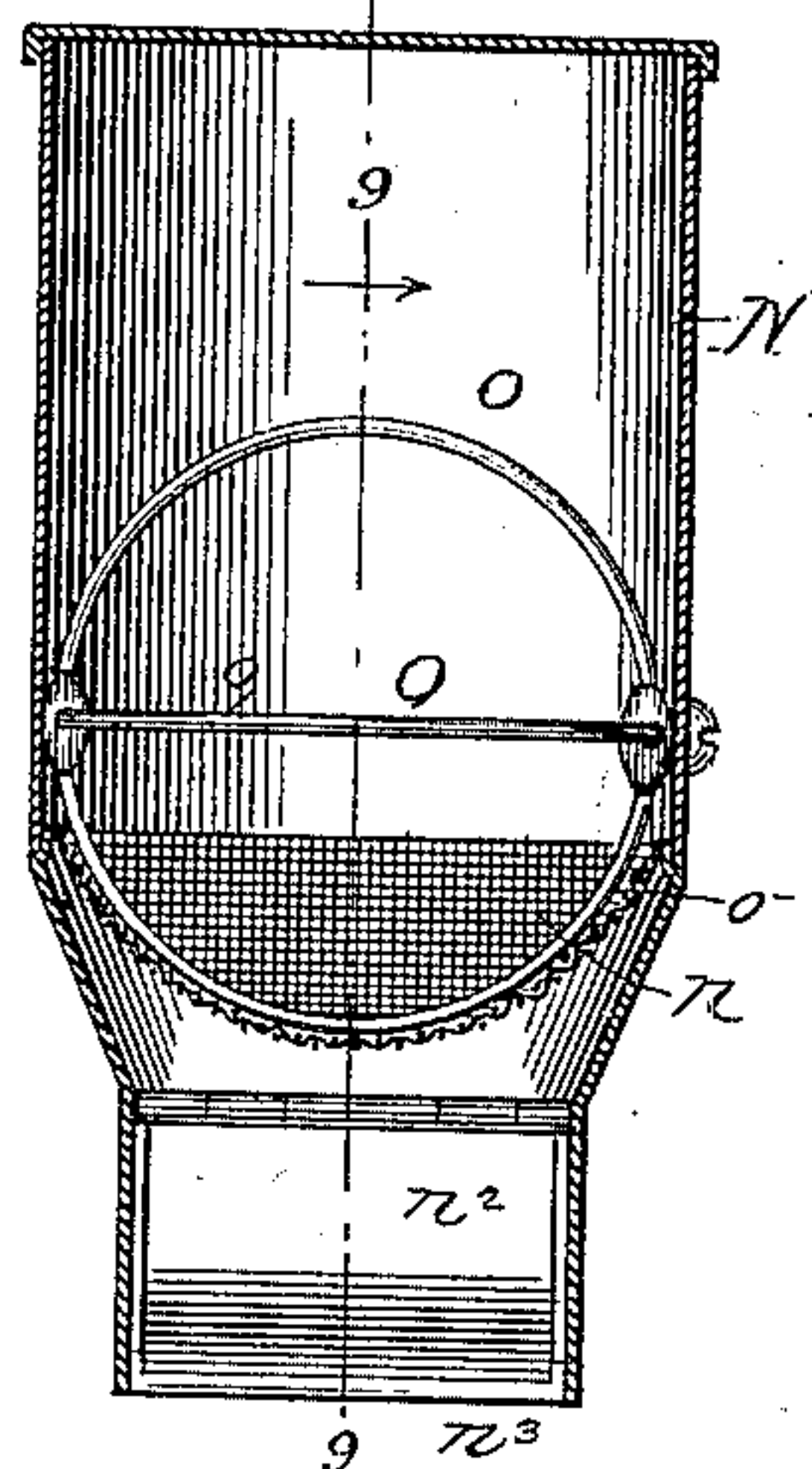
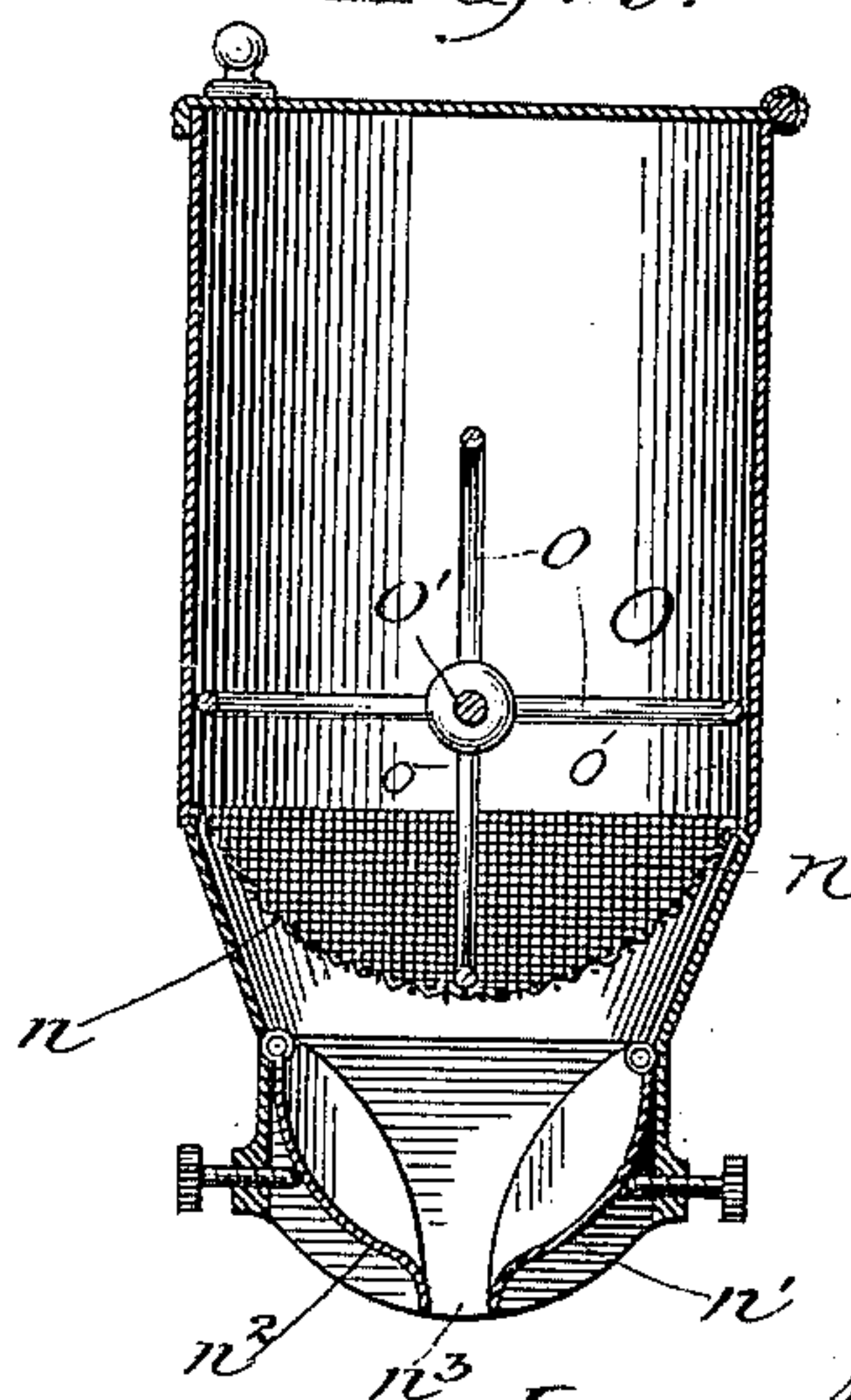
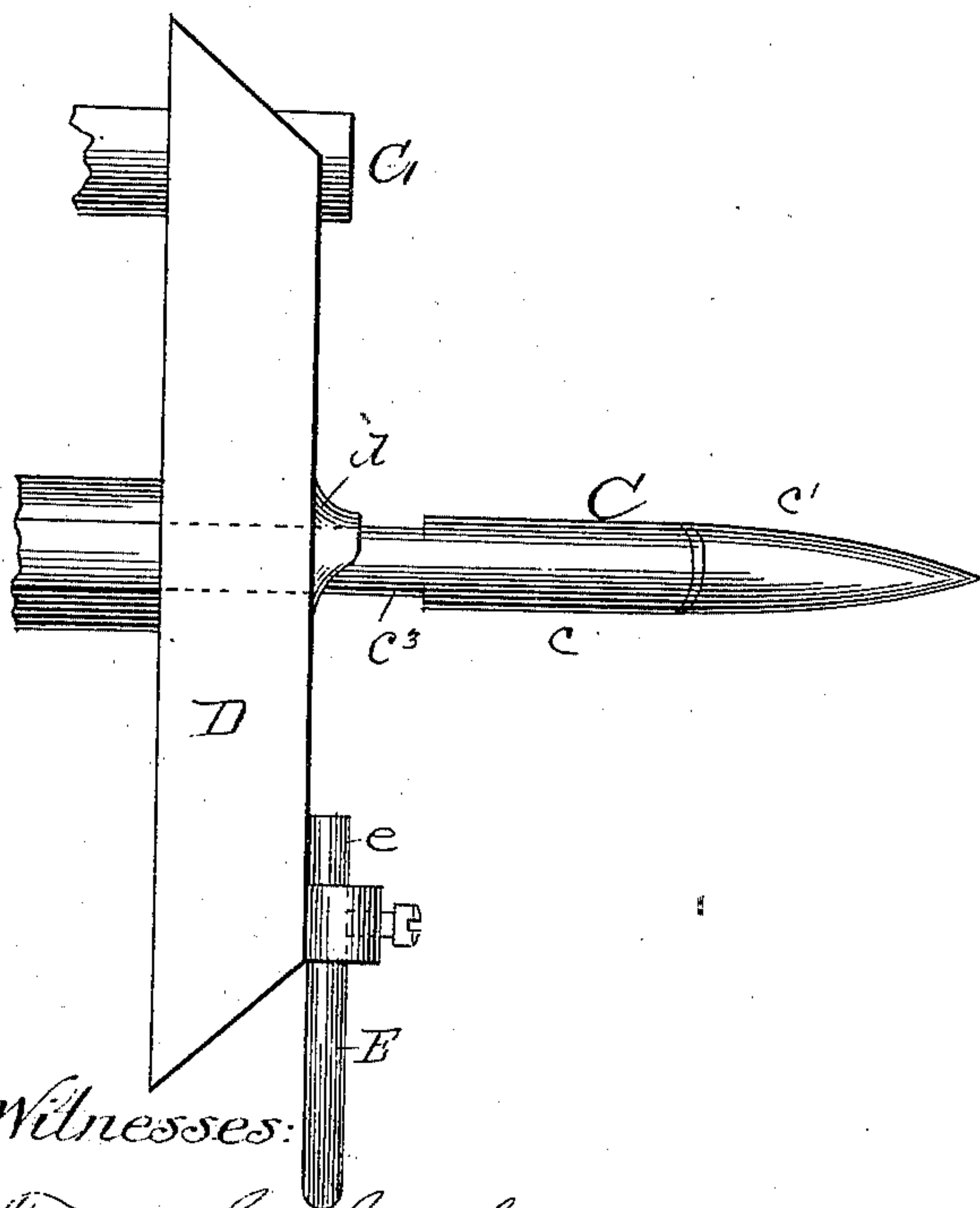


Fig. 9.



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Fig. 7.



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# UNITED STATES PATENT OFFICE.

ALEXANDER J. RUDOLPH, OF CHICAGO, ILLINOIS.

## MACHINE FOR FORMING BOTTLE-NECKS.

SPECIFICATION forming part of Letters Patent No. 668,223, dated February 19, 1901.

Application filed December 8, 1898. Serial No. 698,649. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER J. RUDOLPH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Forming Bottle-Necks, of which the following is a specification.

The invention relates to that class of machines which are automatic or semi-automatic in their construction and which are used for the purpose of forming the interior and exterior surfaces and lip of a bottle-neck.

One object of the invention is to provide a simple, economical, and efficient machine for forming the interior and exterior surfaces and lip of a bottle-neck.

A further object of the invention is to provide means by which one set of mechanisms may be used for the purpose of forming different-sized bottle-necks; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a machine embodying my improvements and showing a bottle in sectional elevation and as being operated upon; Fig. 2, a sectional view of a portion of a bottle and neck; Fig. 3, a plan view of a part of the operating mechanism, partly in section and taken on line 3 of Fig. 1 looking in the direction of the arrow; Fig. 4, an enlarged sectional view of a portion of the mechanism, taken on the line 4 of Fig. 3 looking in the direction of the arrow; Fig. 5, a front elevation of a portion of the mechanism, taken on the line 5 of Fig. 1 looking in the direction of the arrow; Fig. 6, a cross-sectional view taken on the line 6 of Fig. 5; Fig. 7, an enlarged plan view of a portion of the mechanism shown in Fig. 5, looking at it from below; Fig. 8, a cross-sectional elevation of a portion of the charcoal-feeding mechanism, taken on line 8 of Fig. 1; and Fig. 9, a sectional elevation taken on line 9 of Fig. 8.

In the art to which this invention relates it is well known that considerable difficulty is encountered in forming, shaping, and finishing the necks of bottles so as to produce them in uniform and regular shapes and sizes. It is also well known that in most ma-

chines of this type the plug or mechanism which forms the interior of the bottle-neck can be used for one size only, and as a consequence a large number of machines and plugs are required to form the various sizes of bottles used in commerce.

The principal object of my invention therefore is to provide a machine which will remove these objections and which can be used for forming and sizing various-sized bottle necks and lips.

In constructing a machine in accordance with my improvements I use a frame A of the desired size, shape, and strength to hold the operative parts in position and which is provided with the usual boxes *a* and *a'*, in which the mandrel B of the machine is rotatably mounted. This mandrel is supplied with the usual tight and loose pulleys *b* and *b'*, through which power and motion are imparted to the mechanisms.

To size and shape the interior of the bottle-neck, the mandrel is provided with a forming-plug C at the front end thereof and which is formed in two parts *c* and *c'* longitudinally, one part of which, *c*, is rigidly screw-threaded in the mandrel, while the other part is movably secured to the rigid part C by means of the screws *c*<sup>2</sup>, which have threaded engagement in one part, and loosely secured in the other part, as shown in Fig. 4, which permits the movable part to move toward and away from the rigid part to reduce and increase the diameter of the forming-plug. The forming-plug, in order to operate properly for insertion in the bottle-neck, should be held normally at its smallest diameter, and for this purpose a shouldering-block is provided for each portion or section of the longitudinally-divided plug. These shouldering-blocks D D' each have a cylindrical opening or hole for the passage of the reduced portion *c*<sup>3</sup> of each stem-section, as shown in Figs. 4 and 5. The perforations or holes and the reduced portion *c*<sup>3</sup> are of the same diameter, so that each block fits snugly on its support. Each shouldering-block has on its outer face, partially encircling the opening for the stem-section, a lip *d*, having a curved exterior face terminating in a point, and these lips, with their curved faces, form the inside of the mouth of the bottle at the end. One end of the shoul-



dering-blocks D and D' is connected by means of a U-shaped spring E, an arm or free end *e* of which is engaged with a shouldering-block. The tension of the spring is in a direction to hold the blocks normally in engagement with each other, or approximately so, and in this condition the forming-block is at its position of smallest diameter, with the movable part in contact, or nearly so, along its inner edge or face with the fixed part or section.

To separate the shouldering-blocks, a lever G is provided and pivotally mounted upon a shouldering-sleeve H, so that its outer free end may be moved downwardly between the blocks, as shown in Fig. 5, and tend to separate the same and hold the forming-plug at its largest diameter, as shown in Fig. 4.

To form the outside of the bottle-neck, a pair of forming-rolls I and I' are provided and adjustably secured to pivotal levers *i* and *i'*. These levers are pivoted to an arm I<sup>2</sup>, which is made in two parts and secured by means of the pin *i*<sup>2</sup> to the forming-plug, though it may be secured to the mandrel. To operate these levers and move the forming-rolls inwardly, so as to contact a bottle-neck, an operating-sleeve K is provided and preferably slidably mounted upon the shouldering-sleeve, so that as it moves forwardly it contacts the rolls *i*<sup>3</sup> on the forming-levers, so as to move the levers outwardly at their inner ends and inwardly at their outer ends, the reverse being true when the operating-sleeve is moved backwardly. These rolls *i*<sup>3</sup> are arranged to run in grooves *k* in the operating-sleeve, though the grooves may be dispensed with whenever it may be deemed desirable.

To operate the shouldering-sleeve, a bell-crank lever L is provided and connected by means of the rod *l* to a treadle L' and by means of its yoke portion *l'* engages with a groove *h* in the shouldering-sleeve. To operate the operating-sleeve, a hand-lever M is preferably provided, having one end yoked, so as to engage with a groove *k'* on the operating-sleeve. Helically-coiled springs *l*<sup>2</sup> and *m* are used to hold the levers in their inoperative positions.

It is highly desirable to facilitate the operation of forming bottle-necks that a supply of powdered charcoal and rosin be furnished to the rolls and forming-plug, and in order to accomplish this result a reservoir N is provided, which has a concave reticulated surface *n* at or near its bottom portion and gates *n'* and *n*<sup>2</sup>, adapted to be adjusted to regulate the size of its discharge *n*<sup>3</sup>. To agitate and discharge the pulverized material, a scraper O is provided, formed of circular arms mounted upon a shaft O', having its outer end portions adapted to pass near to or in contact with the reticulated surface, agitate the material, and force it through the screen, so that it may be discharged out through the opening. This shaft is provided with a wheel around which a sprocket-chain O<sup>2</sup> is passed, which engages with a wheel on the mandrel,

so as to discharge the material when the machine is in operation and remain immovable when the machine is at a standstill.

It is desirable that when the machine has performed its operation the forming-plug be contracted and the forming-rolls released. In order to accomplish this result, a releasing-rod P is provided and connected by means of a pin *p* with the lever G. The operating-sleeve is provided with a shoulder *k*<sup>2</sup>, adapted to contact the release-rod when the operating-sleeve is at its forward limit of motion, swing the lever G away from between the shouldering-blocks, and permit the U-shaped spring to bring such blocks together and contract the forming-plug. At the same time the rolls *i*<sup>3</sup> on the forming-levers pass over the enlarged portion of the operating-sleeve, so that centrifugal force and springs *i*<sup>5</sup> tend to throw the outer end of such levers outwardly and away from the bottle-neck and permit the bottle to be withdrawn from contact with the plug.

In operation the mechanism is started and powdered charcoal and rosin fed to the rolls and plug. The bottle is placed in the snap Q and its neck forced on the forming-plug. The downward movement of the treadle L' forces the shouldering-sleeve H forwardly for its forward end to contact the rear face of the shouldering-plugs, as shown in Fig. 4. The hand-lever M is then moved downward, which forces the operating-sleeve K forwardly to carry the forming-rolls into contact with the exterior of the bottle-neck and size and shape the same. During this last-named operation the treadle L' is further depressed, so as to move the shouldering-sleeve forwardly to carry the shouldering-blocks D and D' forwardly and act in connection with the forming-rolls to form the lip R of the bottle R'. The further and additional forward motion of the hand-lever operates the release-rod P, so as to throw the lever G out from between the shouldering-blocks and permit the forming-plug to be contracted. At the same time the trolley-rolls on the forming-levers pass over the enlarged portion of the operating-sleeve and permit the forming-rolls to be thrown away from contact with the exterior surface of the bottle-neck and the finished bottle to be removed, all of which can be done without stopping the machine.

To form bottle-necks of different sizes, all that is necessary is to move the forming-rolls inwardly or outwardly in the slots *i*<sup>6</sup> of the forming-levers and to reduce the size of the plug C or change its insertion between the shouldering-blocks.

While I have described my invention with more or less minuteness as regards details of construction and arrangement and as being embodied in certain precise forms, it will be understood that I do not desire to limit myself thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construc-



tion, and arrangement, the omission of immaterial elements, and the substitution of equivalents, as circumstances may suggest or necessity render expedient.

5 I claim—

1. In a machine of the class described, the combination of a rotatable mandrel, a forming-plug having its body or stem longitudinally divided and one section mounted on the  
10 other and free to move outward and inward for forming the interior of the bottle-neck, an adjusting-block on each section of the body or stem of the plug, one block united to the other at one side and free to be separated at  
15 the other side, and means for separating the blocks to carry the movable section of the body or stem of the plug outward to its working position, substantially as described.

2. In a machine of the class described, the  
20 combination of a rotatable mandrel, a forming-plug having its body or stem longitudinally divided and one section mounted on the other and free to move outward and inward for forming the interior of the bottle-neck  
25 and rotatable from the mandrel, a block on each section of the body or stem of the plug longitudinally slidable thereon and transversely separable in their relations one to the other for moving the free section of the body  
30 or stem of the plug, forming-rolls carried by the mandrel and having a circular travel around and with the forming-plug for forming the exterior of the bottle-neck, a sleeve carrying the forming-rolls, and means for advancing and receding the sleeve to carry the  
35 forming-rolls inwardly and outwardly, substantially as described.

3. In a machine of the class described, the combination of a rotatable mandrel, a plug  
40 for forming the interior surface of a bottle-neck made in two or more parts longitudinally, a block secured to each part of the forming-plug, a spring for holding such blocks with the parts of the forming-plug at the innermost position and means for separating the  
45 blocks so as to expand the forming-plug, substantially as described.

4. In a machine of the class described, the combination of a rotatable mandrel, a plug  
50 for forming the interior surface of a bottle-neck made in two or more parts longitudinally, a block secured to each part of the forming-plug, a spring for holding such blocks with the parts of the forming-plug at the innermost position, means for separating the blocks  
55 so as to expand the forming-plug, and means for moving the blocks forwardly to assist in forming a bottle-lip, substantially as described.

60 5. In a machine of the class described, the combination of a rotatable mandrel, a plug for forming the interior surface of a bottle-neck and made in two parts longitudinally one part rigidly secured to the mandrel and  
65 the other movably secured to the rigid part, two shouldering-blocks one secured to each part of the forming-plug, means for moving

the shouldering-blocks to operate the movable part of the plug inwardly and outwardly and contract and expand the forming-plug, 70 and a movable sleeve for moving the shouldering-blocks forwardly, substantially as described.

6. In a machine of the class described, the combination of a rotatable mandrel, a plug 75 for forming the interior surface of a bottle-neck made in two parts longitudinally, one part rigidly secured to the mandrel and the other movably secured to the rigid part, a shouldering-block for each part of the forming-plug, spring mechanism for holding the  
80 shouldering-blocks and forming-plug in a contracted position, a lever for separating the blocks and expanding the forming-plug, a reciprocating sleeve arranged to move the  
85 shouldering-blocks and assist in forming the bottle-neck lip, forming-rolls arranged to rotate with the mandrel and form the outer surface of a bottle-neck, levers upon which the forming-rolls are mounted, and an operating-  
90 sleeve adapted to operate the levers and forming-rolls by its reciprocations, substantially as described.

7. In a machine of the class described, the combination of a rotatable mandrel, a plug 95 for forming the interior surface of a bottle-neck made in two parts longitudinally, one part rigidly secured to the mandrel and the other movably secured to the rigid part, a shouldering-block for each part of the forming-plug, spring mechanism for normally holding the shouldering-blocks and forming-plug  
100 in a contracted condition, a pivoted lever for separating the blocks and moving the free part of the plug outwardly and expanding the  
105 forming-plug, a reciprocating sleeve arranged to move the shouldering-blocks and assist in forming the bottle-neck lip, forming-rolls arranged to rotate with the mandrel and form the outer surface of a bottle-neck, levers upon  
110 which the forming-rolls are mounted, an operating-sleeve adapted to operate the levers and forming-rolls by its reciprocations, and means interposed between the operating-  
115 sleeve and the lever of the shouldering-blocks to operate such lever by the movement of the operating-sleeve and permit the shouldering-blocks and forming-plug to move into their contracted position, substantially as described. 120

8. In a machine of the class described, the combination of a rotatable mandrel, a forming-plug for the interior of the bottle-neck having its body or stem longitudinally divided and one section movably mounted on the other 125 and free to move outward and inward, a clamp for the divided forming-plug consisting of a block mounted on each section of the body or stem of the plug yieldably held at one end and free to be opened at the opposite end, a  
130 movable wedge for spreading the clamp, forming-rolls for sizing and shaping the exterior of a bottle-neck and traveling in a circle around and with the forming-plug from the



rotation of the mandrel, and lever mechanism having the forming-rolls adjustably secured thereto for connecting, supporting and rotating the rolls from the rotatable mandrel, substantially as described.

5 9. In a machine of the class described, the combination of a rotatable mandrel, a forming-plug having its body or stem longitudinally divided and one section movably mounted on the other and free to move outward and  
10 inward, a clamp mounted on the divided body or stem of the plug and held normally closed, a wedge for spreading the jaws of the clamp and carry the movable section of the body or  
15 stem of the plug outward, forming-rolls encircling the forming-plug and revolving in a circle around and with the forming-plug from the rotation of the mandrel, a longitudinally-moving sleeve carrying the forming-rolls, and  
20 means for moving the sleeve and adjusting the rolls and the forming-plug, substantially as described.

10. In combination with a machine of the class described, a reservoir for holding a supply of powdered charcoal and rosin, a concave  
25

screen at the bottom portion thereof, wings or stirrers rotatably mounted in such reservoir and adjacent to the screen mechanism to agitate and force the pulverized material through the screen, and means connected with a rotatable part of the machine for rotating the stirrer, substantially as described.

11. In combination with a machine of the class described, a reservoir for holding a supply of powdered charcoal and rosin, a concave  
35 screen at the bottom portion thereof, an adjustable gate arranged underneath the concave screen to regulate the discharge-opening of the reservoir, circular wings or stirrers rotatably mounted in such reservoir adjacent  
40 to the screen mechanism to agitate and force the pulverized material through the screen, and means connected with a rotatable part of the machine for rotating the stirrer, substantially as described.

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