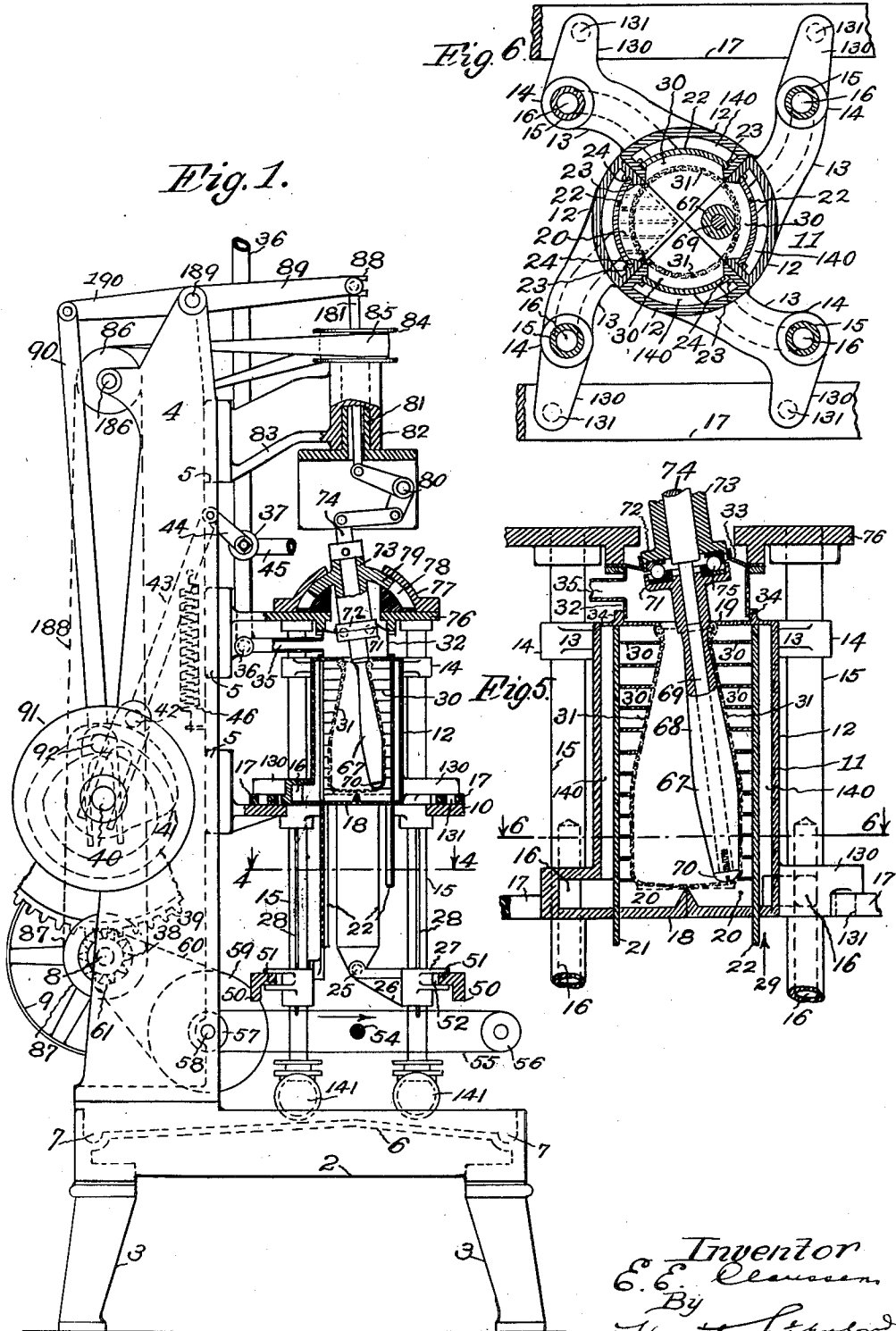


E. E. CLAUSSEN.
MACHINE FOR MAKING PULP RECEPTACLES.
APPLICATION FILED JUNE 26, 1918.

1,434,091.

Patented Oct. 31, 1922.

4 SHEETS—SHEET 1.



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By
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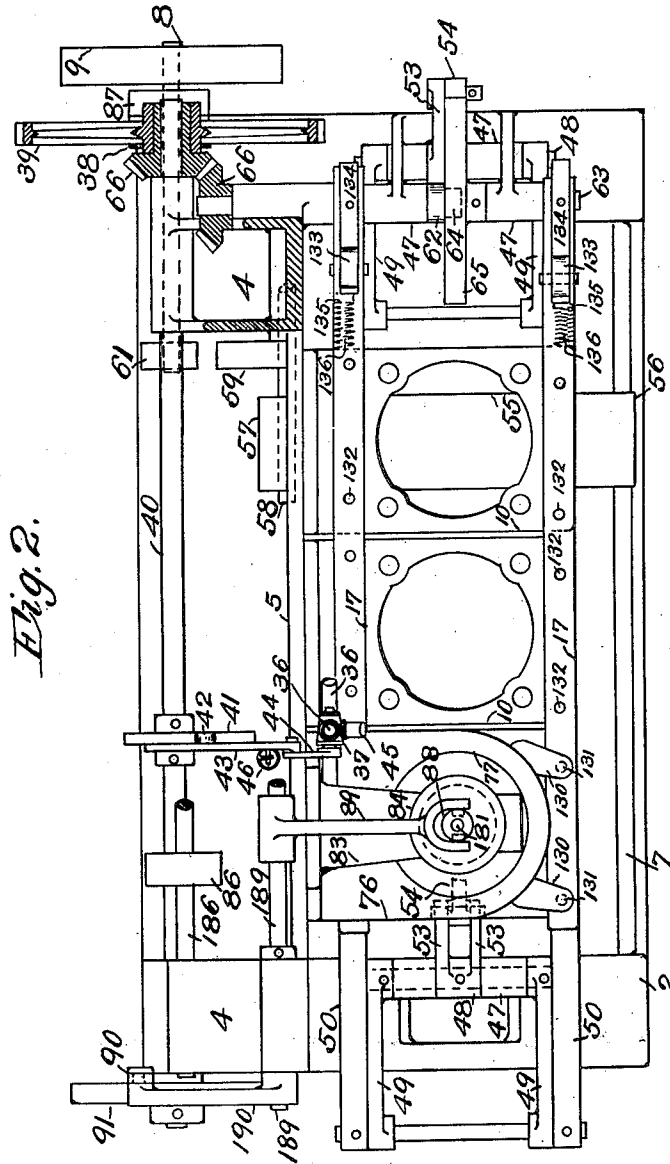


Fig. 2.

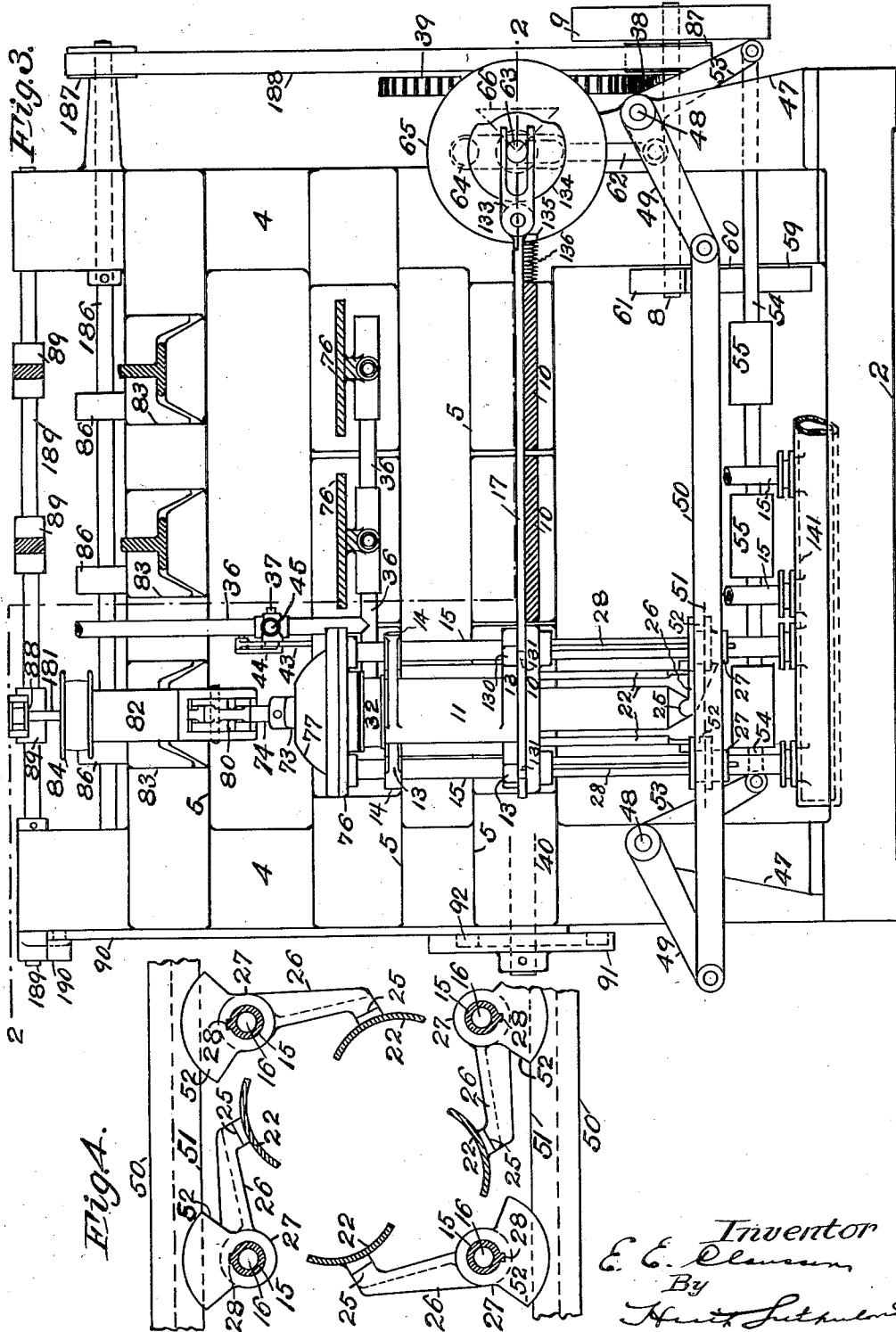
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4 SHEETS—SHEET 4.

Fig. 7.

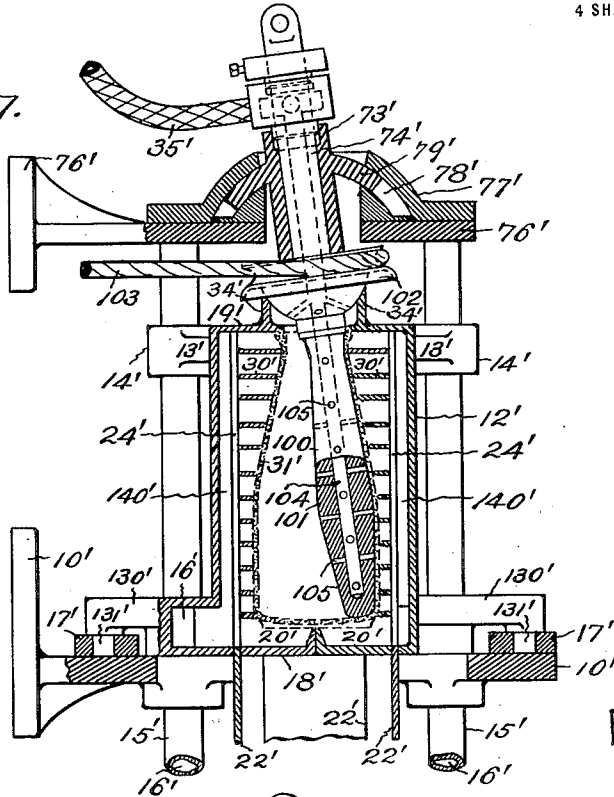


FIG. 9

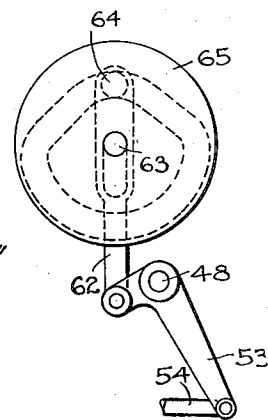
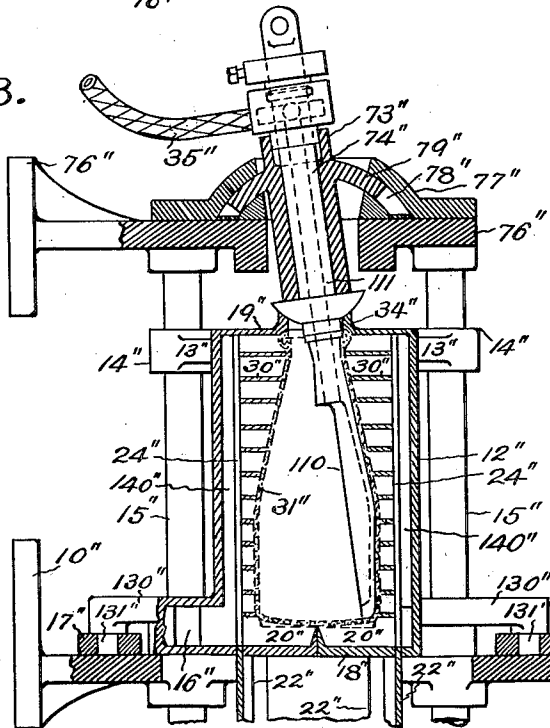


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDWARD E. CLAUSSEN, OF HARTFORD, CONNECTICUT.

MACHINE FOR MAKING PULP RECEPTACLES.

Application filed June 26, 1918. Serial No. 242,101.

To all whom it may concern:

Be it known that I, EDWARD E. CLAUSSEN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Making Pulp Receptacles, of which the following is a specification.

This invention relates to a machine for making pulp receptacles. As a part of the invention is a method. The receptacle may be employed for a variety of different purposes.

In the drawings accompanying and forming part of the present specification I have shown one of the several convenient forms of embodiment of the invention, and this I will set forth rather fully in the following description, primarily to enable those skilled in the art to practice the invention. As an incident thereto the method as to one desirable form will be disclosed. As will be inferred, I am in no sense restricted to this particular showing; I may depart therefrom in several respects for both as to the machine or apparatus and the method there are, I believe, certain broad features involved. The resultant article made by the machine or apparatus or the method for that matter, may be employed for different purposes. I might note at this juncture, however, that the machine shown is particularly organized for making what is known as a pulp bottle. Although the bottle is probably primarily intended to contain milk, it is adapted just as well to receive other liquids, semi-liquids or solids for that matter.

Referring to said drawings:

Figure 1 is a side elevation of the machine with parts in section.

Figure 2 is a top plan view of the machine partly in section taken on dash and dotted line 2—2 of Fig. 3.

Fig. 3 is a front elevation of the same.

Fig. 4 is a cross section on the line 4—4 of Fig. 1, looking in the direction of the arrow with the elements of the cage open.

Fig. 5 is a vertical section of certain of the parts appearing in Fig. 1.

Fig. 6 is a cross section on the line 6—6 of Fig. 5, looking in the direction of the arrow.

Figs. 7 and 8 are views corresponding practically to Fig. 5, of modified arrangements.

Fig. 9 is a detail view in elevation of a cam, a rod and certain adjunctive devices hereinafter more particularly described.

Like characters refer to like parts throughout the several views, which are on different scales.

I have several motives in view. One of my aims is to force pulp of suitable character into a mold of proper kind. This pulp may obviously be directed into the mold in any desirable way, air pressure being generally utilized for the purpose. I prefer that the air pressure be applied in such manner as to blow away the water in the pulp while a part of the bottle or other article is being pressed or otherwise acted upon. As a matter of fact I prefer a roller or its equivalent to secure these results, the action of the roller or analogous means being such as to press the bottle within the same to leave a smooth interior. This roller also functions to loosen the bottle from the screen throughout the entire extent thereof when occasion arises therefor. I also desire to employ what I term a cage to lay on the layers of pulp. While the foregoing is a concise description of some of the primary features in the invention, I am as will be inferred in no sense restricted thereto. The machine is designed in units, merely one of which is shown and will be hereinafter described. More of these units may be added if desired.

The different parts of the machine will be supported by a suitable framework. That shown comprises in its make-up the base or bed 2 provided with several pendent legs as 3 to rest on a floor or other suitable foundation, and if necessary to be bolted or otherwise fastened thereto. As a part of the frame or supporting structure, there is a pair of columns or uprights as 4 rising from the back of the base or bed near the ends thereof, and tied together at suitable intervals by crossbars as 5.

Within the base or bed is mounted a pan as 6, the bottom of which consists of two portions which as shown converge just forward of the transverse center line of the bed or base 2. Around the marginal portion of this pan is a groove or gutter as 7 in which the water falling onto the bottom of the pan can flow to be disposed of as may be desired, this water being merely leakage that may occur during the production of a pulp arti-

cle. I might observe at this point that when I use the term "pulp" I do so in a generic sense, not only to include paper stock but anything of an equivalent nature.

5 The machine has several parts which are actuated by some convenient source of power and the means shown for this purpose will now be set forth concisely at least at this point. The same involves a main or power
10 shaft as 8 supported by one of the columns or uprights 4, the one on the right in Fig. 3. This shaft 8 carries at its outer end the pulley or band wheel 9 fastened thereto in some suitable way and belted up to a convenient
15 mating pulley or band wheel which I have not deemed it necessary to show.

The mold construction may be of any suitable nature, and in this connection reference should best be had to Figs. 1, 5 and 6. The
20 lower cross bar 5 is shown as provided with a forwardly extending shelf or support 10 which constitutes a convenient carrier for a mold such as that denoted in a general way by 11. This mold 11 I might note is of sectional form, comprising in the present case
25 four practically similar segments 12. When these segments mate or abut, the mold 11 is closed as shown by Figs. 5 and 6; a cylindrical structure is thus presented. The segments 12 are as shown provided at their upper and lower ends with ears or projections
30 13 extending outwardly therefrom and practically tangentially thereto, these ears terminating in hubs or sleeves 14 rigid as represented, with the rods or bars 15
35 which are also practically cylindrical in shape and which are hollow at least for a portion of their lengths, the hollows or bores being denoted by 16 and extending
40 from the lower ends of the rods or bars to a short distance above the shelf or support 10, for a reason that will hereinafter appear. There are in the present case four of these rods or bars 15, and they are at the
45 corners of a rectangle. They are also disposed between the parallel rods 17, the latter as I will hereinafter explain, functioning in the opening and closing of the mold 11. Each segment 12 of the mold carries two of the ears 13 situated near the upper and lower
50 ends thereof. The mold 11 as will be understood, comprises a bottom as 18 and a top as 19. As will also be clear, said bottom and top each consist of four segments rigid for instance by being made integral, with the
55 respective segments 12 to which I have already referred, so that when the mold is closed there is a cylinder presented, having a body or walled part, a bottom practically
60 imperforate, and a top partly open for a reason that will hereinafter appear. The bottom 18 has across it on the upper side thereof, the radially disposed strips 20. These strips extend up from the bottom 18
65 but a short distance, and are spaced, how-

ever, from the interior of the body of the mold at their ends for a reason that I will hereinafter explain.

In addition to the mold there is what I have already referred to as a cage, which
70 performs a function in the production of the plastic article to be produced, and such a cage as that denoted in a general way by 21 meets my conditions. This cage like the mold comprises four practically similar segments 22. The mold I might observe has in
75 the present case merely an opening and a closing movement, at which time the hubs 14 swing with the rods, bars or shafts 15. The cage 21 as I will hereinafter explain partakes of this swinging movement, but in addition to this swinging movement it has also
80 an endwise movement or one in a direction corresponding with the axes of the mold, and the cage, and the reason for this relative axial or endwise movement will also be hereinafter explained. The segments 22 are spaced from the respective segments 12, and these spaces between the two parts function as ways or ducts. The segments 12 have
85 at their lateral edges the inwardly-projecting flanges 23 which extend the complete length or depth of said segments and which are provided on their inner faces, (their outer faces abutting when the mold is closed) with grooves or channels 24 throughout their
90 entire extent, which slidably receive the segments 22 of the cage in order to provide for the ready and free movement of the segments or sections of the cage as occasion requires. The segments 22 of the cage are as
95 shown jointed as by pivoting at 25 at their lower ends, to the arms 26 which are furnished with hubs 27 at their outer ends which slidably fit the four bars, rods or shafts 15 and are splined thereto as by the longitudinally-extending keys 28 on said rods or shafts. In view of this circumstance it becomes clear that the hubs 27 can slide on said
100 rods or shafts 15. When, however, the rods or shafts 15 are rocked, the sections of the cage as well as those of the mold will be either opened or closed, depending upon the direction in which the rods or shafts 15 are rocked. The lower arms 13 of the mold sections 12 are provided in turn with outwardly
105 extending arms 130 having studs 131 which enter holes 132 in the bars 17. At the right of the machine (Figs. 2 and 3) the bars 17 carry rollers 133 engaging cams 134 on the shafts 63. On the lower sides of said bars 17 are projections 135 between which and the stationary brackets 10, springs are placed which close the section 12 according to the timing of the cams 134.
110 115 120 125

The arrow 29 in Fig. 5 indicates the direction of retracting movement of the cage 21, said cage in fact in said view being shown in its extreme retracted position at which time its upper end abuts against the top 19
130

of the mold. Advancing movement of the cage will of course, be opposite to the arrow 29. The mold 11 has interiorly thereof the flanges 30, these flanges being as shown at right angles to the strips 20 and being horizontal, although this may not always be necessary. These flanges are spaced apart for a reason that I will hereinafter set forth, and they are rigid at their outer ends with the sections or segments 12 of the mold and at their inner ends support what I term the screen 31, this screen being also made of four sections or members. When the screen is closed its shape is practically that of the outside of the bottle to be formed. The screen obviously comprises a body and a bottom and each of its segments naturally involves a wall or body portion and a bottom portion, and when the mold is closed in the manner I have already noted, the wall or body portion and the bottom portion of the screen mate to present a bottle-shaped screen. The sections of the screen are connected rigidly to the spaced flanges or partitions 30 in any convenient way, and the sections or segments 22 of the cage move between the ends of these flanges or partitions 30. It therefore, follows that on the opening of the mold 11 and the consequent opening of the cage 21, the screen 31 is likewise opened, being fastened as I have already stated to the segments or sections 12 of the mold. I have already referred to the fact that there is a roller which presses the article being produced smooth on the inside and as an additional function this roller also loosens the bottle or as it might be considered blank from the screen 31. The segments of the bottom of the screen are made rigid in some suitable way to the appropriate partitions or strips 20 of the bottom of the mold, so that the screen is adequately supported at its bottom and lateral parts. Between the cage sections 22 and the outer walls of the mold sections 12 are chambers 140 which connect with channels in the lower arms 13 and the bores 16 of the rods 15. The lower ends of said rods 15 project into the pipes 141 for a reason that will be hereinafter stated.

Surmounting the mold 11 is what I term a "cup" 32 preferably of rubber or some equivalent elastic or flexible material. This cup is inverted and its top 33 also of flexible material acts as a diaphragm as I will later explain, in cooperation for instance with a roller and its adjuncts. This elastic or flexible cup 32 fits within the flange or bead 34 rising from the top 19, the flange or body being obviously of sectional form and its sections corresponding practically to those of the parts of the said top. This cup has an inlet as 35 in the form of a tube integral with the appropriate section of the body of the cup, this tube being intended for the passage of pulp and air in desired order. The

inlet or tube 35 is connected with the supply pipe 36 at practically the lower end thereof in a water and air-tight manner. This supply pipe has a rigid connection of some suitable kind with the framework of the machine on the forward upper portion thereof and its upper end is connected with a suitable source of pulp supply which I have not deemed it necessary to illustrate. In said pipe 36 near the lower end thereof is a casing for a valve as 37 of three-way type, this valve being operable to first admit pulp to the mold and its adjuncts and subsequently to admit air, the latter being utilized to blow out the surplus or unnecessary water in the pulp, so that when the article is taken from the mold it is semi-dry or in a practically finished condition. It may be at times necessary to subject the article to some subsequent drying; at any rate the excess or unnecessary water is removed from the pulp in a positive manner, but I realize that this particular point in itself is not broadly new with me.

I will assume that the cage 21 is in its extreme retracted position as shown best in Fig. 5 and that as a consequence its upper edge is against the top 19 of the mold, all of the mold parts at this time being closed. The three-way valve 37 will then be opened, automatically in the present case, thus permitting the flow of pulp from the pipe 36 to the supply tube 35 and the consequent direction of the pulp into the closed screen 31. The pulp will pass from the cup 32 naturally downwardly and into the screen adhering to the inner surface and body of the screen. The water that passes through the screen flows between the partitions 30 to the chamber 140, the channels of the lower arms 13, bores 16 of the rods 15 and into the pipes 141 out of the machine. It will of course, be understood that before the pulp can be directed into the screen 31, it will be necessary to advance (by moving downward in the present case) the cage 21, and I will later describe how this particular action is effected. On the advance motion of the cage the pulp can be directed against the screen and the amount of pulp adhering to the screen will depend upon the duration of time that the cage is left in a given position. I have mentioned the fact that the cage is in its extreme retracted position in Fig. 5. When this condition is present of course, no pulp can be directed into the screen. On the advance of the cage, however, pulp can pass into the screen but only at the place in transverse line with the upper end of the cage. It is assumed that the valve 37 has been opened to permit pulp supply. With this assumption in view I will further suppose that the cage is advanced. As the cage is thus advanced or moved downward, as shown pulp will be permitted to flow

into the screen and will adhere to that surface thereof interiorly of the same which has been uncovered in effect by the cage on its forward movement. By timing this movement of the cage, it is obvious that I can grade the thickness of the body of the bottle being molded. It may be desired and probably will be to have the neck of the bottle considerably thicker than the body, and in this event the initial advance or forward movement of the cage will be slower than the ensuing action, in view of which circumstance the bottle at the neck can be made thicker than the remainder and by thus timing or regulating the forward movement as I have considered it, of the cage, the requisite thickness of the bottle can be accurately governed, because as I have observed pulp will be applied to the screen only where the screen is free of the restraining effect of the cage and this restraining effect is removed by the advance of the cage. It will be understood that the cage completes its advance when in its lowermost position or practically as illustrated in Fig. 1.

As shown (Fig. 3) the main shaft 8 has fastened to it the pinion 38 (see also Fig. 1) in mesh with the spur gear 39 fastened to the shaft 40 which extends between and is supported by the columns or uprights 4. This shaft 40 has rigid therewith, the cam 41 cooperative with the stud or roller 42 (see also Fig. 2) on the rod 43 forked at its lower end to embrace said shaft 40 and connected at its upper end by a pivotal joint, for instance with the crank arm 44 of the valve 37 situated at the junction of the pipes 36 and 45, the pipe 45 being for the supply of air from a suitable source. Connected to the rod 43 and also to the adjacent column or upright 4 is a retracting spring 46. It will be supposed that the main shaft 8 is in motion and that the mold 11 and cooperating elements are closed. At the proper point in the rotation of the shaft 40 the cam 41 will engage the anti-friction roller 42 to impart an upward movement to the rod 43, thus stretching the spring 46 and as a consequence, opening the valve 37 to first cause pulp supply which is directed into the mold and at a subsequent point, the direction of air into the mold to secure the removal of surplus water. After the stud or anti-friction roller 42 has been operated by the cam 41, the spring 46 will impart a downward movement to the rod 43 to thus shut the valve 37 and stop further supply of pulp and air.

At the present time it will be understood that I am assuming that the mold and the various parts connected therewith are closed in the condition for instance as shown by both Figs. 5 and 6. Just about the time the valve 37 is opened to secure first the supply

of pulp and then the necessary air to the mold, the cage 21 is advanced, and I will now set forth a means by which this particular condition is brought about. On the base or bed 2 at opposite sides thereof (Fig. 3) are brackets 47 which carry at their upper ends the rock shafts 48. On the forward ends of these rock shafts are rock and crank arms 49 connected at their lower ends by bars 50, it being evident that there are two of such bars. These bars are provided on their inner sides with flanges or beads 51 (Fig. 1) which enter comparatively freely, channels 52 in the several hubs 27. The shafts 48 have in addition to the rock arms 49 other rock arms 53. While each shaft 48 is equipped with two of the rock arms 49, it only has, however, one of the rock arms 53. The lower ends of the two crank arms 53 are connected by a rod 54 which extends between the runs of the belt 55 onto which the finished bottle is dropped when the mold and cooperating elements are opened, as I will hereinafter set forth. This belt 55 passes around the drums 56 and 57, the inner drum 57 being rigid with the shaft 58, the framing having suitable bearings to support said shaft. The shaft 58 carries a pulley 59 connected by a belt as 60 with a small pulley 61 on the main shaft 8 so that the belt or carrier 55 is continuously operative, at least as long as the machine is in action. One of the arms 53 or that on the right in Fig. 3 has jointed to it the lower end of the rod 62 having a guide connection of suitable kind with the shaft 63 (Fig. 3), the stud or anti-friction roller 64 on said shaft 63 being cooperative with the cam 65 fastened to said shaft 63 driven by bevel-gearing denoted in a general way by 66 (Fig. 2) and actuated from the shaft 8. When the machine, therefore, is thrown into action to accomplish a sequence of movements, the cage 22 through the described parts is gradually advanced, the cam 65 being so shaped as to effect first a slow advance of the cage and then the subsequent advance at a little higher speed, in view of which circumstance the pulp at and around the neck or mouth of the bottle will be thicker than at the remainder. Beyond this time at which the stock is thus thickened, the motion of the cage is practically uniform, but is accelerated relatively speaking when about the middle of the bottle is reached, because the upper portion of the bottle below the neck is a trifle thicker than the lower part which is virtually of uniform thickness in cross section. The final part of the motion brings the upper edge of the cage 21 practically coincident with the upper surface of the bottom 18, and when the latter relation ensues the water in the pulp constituting the bottom of the bottle blank is deposited on the screen and the water that

is blown through the screen passes between the strips 20 through the channels of the lower arms 13, bores 16 of the rods 15 and into the pipes 141 out of the machine. It will be understood that during the lowering of the cage 21 the supply of air or equivalent is on, because while air is decidedly the preferable agent, it is within the bounds of possibility that something else might be utilized. When air is the factor and it is as I state, the preferred one I prefer also that it be heated.

There is within the screen 31 suitable means such as the roller denoted in a general way by 67 which with cooperating means presses the inner surface of the bottle throughout its entire extent so as to impart to the inner surface a smooth even finish. The roller 67 comprises a body 68 which is adapted to turn on the lower reduced end of the shaft 69, and a cap piece 70 in the form for instance of a screw threaded into the lower end of the shaft 69 and the flat part of the spherical head of which overlies the lower end of the roller body 68 to hold said body in assembled relation with said shaft 69. The active or smoothing portion of this roller body 68 is practically the same in form as the inner shape of the bottle being formed, the roller body rolling the inner surface of the body of the bottle while the spherical head of the screw 70 rolls the bottom of the blank or bottom. The roller 67 is in the present case given what might be considered as a gyratory motion, and owing to this condition the inner surfaces of the body and bottom can be uniformly and accurately smoothed out throughout their entire area. The roller body 68 has a peripherally flanged head 71 cooperative with a practically similarly shaped base or foot 72 at the lower end of the sleeve 73 on the shaft 74; this peripherally flanged base or foot 72 cooperating with the head 71 and the two receiving between them an anti-friction bearing denoted in a general way by 75. The base or foot 72 fits closely or in an air and watertight manner in a central opening in the top, diaphragm or gasket 33. The rods or bars 15 to which I have already referred are surmounted by a bracket or shelf 76 which in turn is provided with an element such as that denoted in a general way by 77 having a spherical way 78 to receive the spherical flange or skirt 79 of the sleeve 73; this permits the necessary gyratory movement of the roller 67 without affecting the proper action thereof. The shaft 74 is connected by a linkage connection such as that denoted in a general way by 80 with the shaft 81 supported by the bearing 82 on a bracket 83 extending from the upper crossbar 5. The shaft 81 as shown is provided at its upper end with a pulley 84 connected as shown by a cross belt 85 extending over the idler 86

fastened on the shaft 186 journaled in the uprights 4. On the outside of the upright (Fig. 3) this shaft 186 carries fastened thereto the pulley 187 which is driven by the belt 188 from the pulley 87 on the main shaft 8. It will, therefore, be clear that when said main shaft is in motion the roller is given the necessary gyratory motion so as to smooth down the interior of a bottle which is being formed. It should be noted that the roller 67 in addition to the smoothing action which is important, has what is equally important or practically so, a compressing action on the pulp so as to densify the same, in view of which the resultant article possesses the requisite rigidity. It should also be noted that the diameter of that part of the roller 67 or its equivalent which is within the bottle should be less than the diameter of the mouth of the bottle, so that the two can be relatively separated which condition is brought about in the present case by the dropping of the bottle and further by bringing the roller to a practically perpendicular or upright position wholly free of the lateral parts of the body. While this particular action may be obtained in any desirable way, I will now set forth the means for accomplishing this action. Through the hollow shaft 81 floats the rod 181 which is connected at its lower end to the linkage 80 and at its upper end the spool 88 to which is jointed the lever 89 on the shaft 189 journaled between its ends in the framework of the machine. At the outside and to the left-hand side (Fig. 3) the shaft 189 has fastened thereto the lever 190 to which is jointed the rod 90 operable by the cam 91 which has a stud 92 to engage the lower end of said rod 90 at the proper point, so that through the intermediate described parts the roller 67 will be brought to an upright position at the time the bottle is finished, it being understood that at this particular point the cage 21 is in its extreme lowest or retracted position. It will also be understood that at the same time the mold 11 and screen 31 are opened, so that the bottle now formed, can drop onto the belt 55, the upper run of which moves toward the right in Fig. 1 as indicated by the arrow therein.

The action of the machine is as follows: It will be assumed that the mold 11, cage 21 and screen 31 are closed as shown in Figs. 1, 5 and 6, which conditions have been brought about in the manner set forth. Pulp will first be admitted into the screen 31 on the advance of the cage 21 from its extreme backward position. Air will be directed into the mold, so as to cause the pulp to be applied to the inner surface of the foraminous or reticulated screen 31. This action is continued until the bottle is fully formed at which time the cage 21 will have been so retracted that its upper edge

is brought flush with the upper surface of the bottom 18. As the pulp commences to flow the roller 67 stands upright but just beyond this point the roller is given its compound movement so as to rotate and at the same time revolve it, the revolutions gradually increasing in extent until the roller is brought into contact with the inner surface of the blank, just about the time the blank is shaped up into a bottle. This roller continues to traverse the inner surface of the bottle in the manner I have described until it is smoothed out to the required degree. When this is accomplished the roller still being in contact with the inner surface of the blank the mold 11, cage 21 and screen 31 are opened in the manner to which I have referred, and the roller 67 by engaging the blank or bottle actually dislodges the same from the screen 31, so that the blank or bottle can drop onto the belt 55 and be carried away for subsequent treatment of any kind should the same be necessary. Just about the time the bottle or blank falls onto the belt or carrier 55 the roller 67 is brought to its upright position in readiness to subsequently repeat the operation.

In Fig. 7 I show a mold and certain co-operating parts which are practically the same as those already described, for which reason I will use the same characters with prime marks. The only difference or in fact the only appreciable difference between this and what I have already described is in the roller. This modified form of roller I will denote in a general way by 100. It comprises a body 101. This roller body 101 is provided near its upper end with a sleeve 102 to receive the band 103 by which the roller 100 will be rotated. This roller 100 has through it the bore or passage 104 extending almost to the lower or foot end of the roller. From this bore or passage lead the outlets 105. Into the bore or passage 104 are directed the pulp and air in sequence, the pulp passing along the bore and at the outlets 105 onto the screen 31'. The roller 100 is turned by power. While the roller 67 is also turned it is rotated, however, by its frictional engagement with the pulp which is to form the bottle.

In Fig. 8 the parts which correspond with those in Figs. 1 to 6 inclusive where they appear, will bear like characters with double prime marks. In this case the roller is not cylindrical but is in the form rather of a spoon denoted in a general way by 110, fixed to the lower end of the tubular shaft 111. This shaft is given a rocking motion but does not turn. The active or rounded portion of the spoon, however, does smooth down the interior of the bottle and densifies the stock thereof throughout the entire inner surface which conditions of course exist with the other forms of rollers.

It will be clear that the means in the article being produced of whatever nature the same may be, functions to smooth and press the stock, and at the same time, although this function is performed at a later period, effects the positive separation of the bottle from the mold mechanism. It will also be clear that it is possible that I may within the spirit of the invention reverse some of the actions. It will be understood that the supply of the stock may be accomplished in other ways than those specified and the removal of the excess stock and superfluous water may also be otherwise obtained. As a matter of fact the invention comprehends certain broad conditions, and as already explained I have set forth certain ways of carrying the invention into effect to which I am obviously not restricted.

I desire to make it clear that what I have considered and termed a "mold" which is the term by which it has been known to me, is also known to others as a separable casing. What I have considered a "screen" has also been known as a screen mold. It is well also to make it clear what are the movements of the screen or screen mold of which that denoted by 31 meets my conditions. This screen mold is given an advancing movement opposite to the arrow 29 in Fig. 5 from its upper or retracted position which it is shown as occupying in said view. As I have also explained it is advanced by a gradual downward movement.

What I claim is:

1. The combination of a separable casing, a cage within and spaced from the casing, a screen mold within and spaced from the cage, means for relatively moving the cage and the screen mold to cause the cage to relatively uncover the screen mold, and means for directing pulp into the screen mold.
2. The combination of a cage, a mold screen within the cage, a casing surrounding the cage, the casing being spaced from the cage, and the cage being spaced from the mold screen, means for relatively moving the cage and the mold screen in a direction corresponding approximately to their longitudinal axes to cause the cage relatively to expose the mold screen, means for directing pulp onto the mold screen when the cage exposes the mold screen, and means for applying a pressure to the pulp mass upon the mold screen throughout approximately the entire area thereof.
3. The combination of an approximately imperforate cage, a foraminous mold screen within and spaced from the cage, a casing surrounding and spaced from the cage, the axes of the three parts being approximately coincident, means for relatively moving the cage and the mold screen in the direction of said axes to cause the cage relatively to ex

pose the mold screen, and means for directing pulp onto the mold screen when the cage and the mold screen are thus relatively operated, and for also directing air through the pulp mass on the mold screen.

4. The combination of a mold screen, means for applying pulp onto the mold screen within the same, a rotary roller for applying pressure to the pulp upon the mold screen, and means for freeing the exterior pressure of the mold screen therefrom, to thus release the pulp article, and means for disengaging the pressure applying means and the pulp article when the mold screen is exteriorly freed.

5. The combination of a bottle-shaped

mold screen, means for supplying pulp into the mold screen and directing it against the inner surface of the wall and bottom portion of the mold screen, a roller to rotate against the pulp and occupying an inclined position to the longitudinal axis of the screen during the rolling operation, and means for bringing said roller with its axis conforming approximately to that of the mold screen.

In testimony whereof I affix my signature in the presence of two witnesses.

EDWARD E. CLAUSSEN.

Witnesses:

L. L. MARKEL,

HEATH SUTHERLAND.