E. E. CLAUSSEN.

MACHINE FOR MAKING PLASTIC ARTICLES.

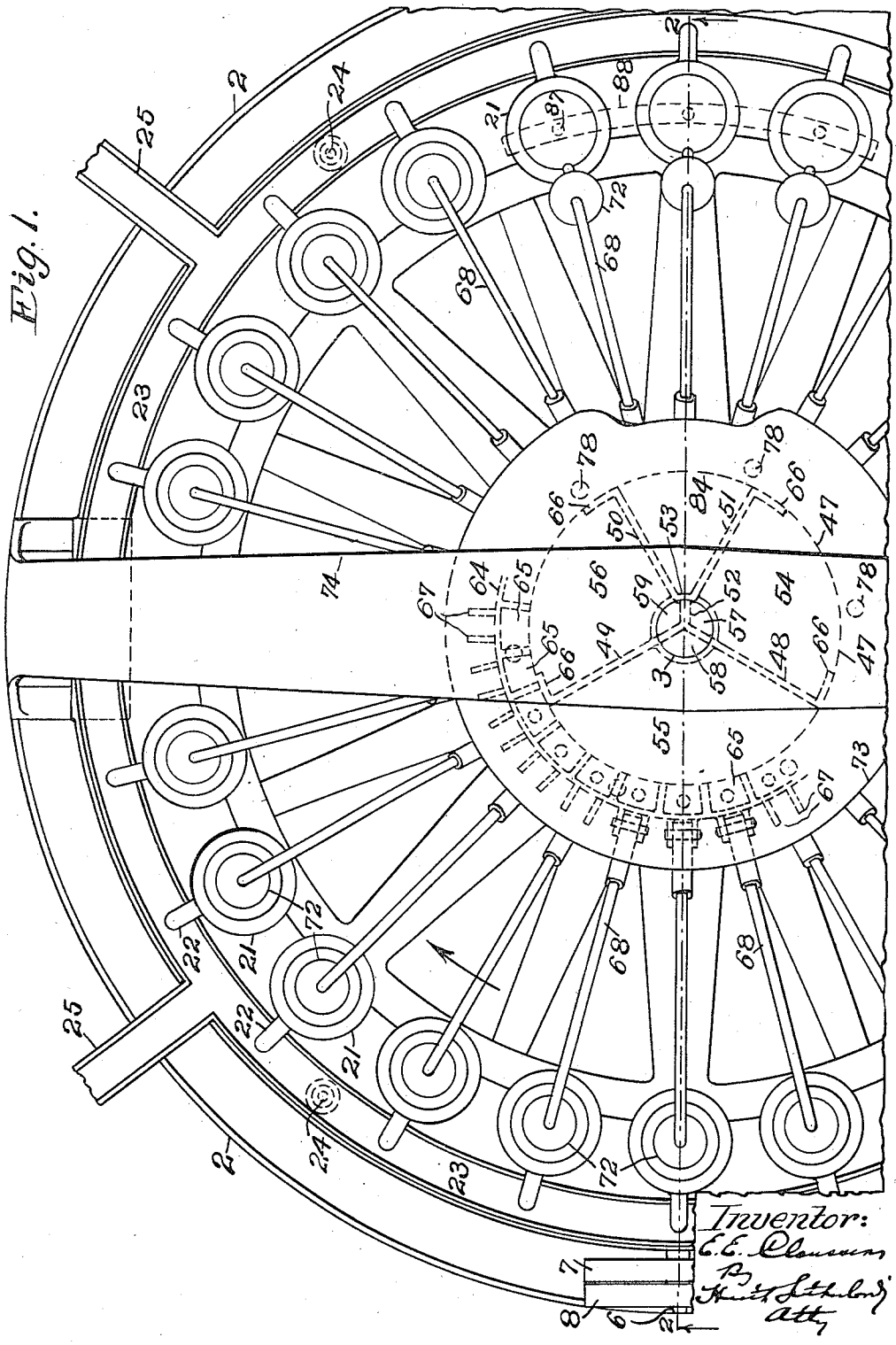
APPLICATION FILED JUNE 3, 1916.

1,267,632.

Patented May 28, 1918.

4 SHEETS—SHEET 1.

Fig. 1.



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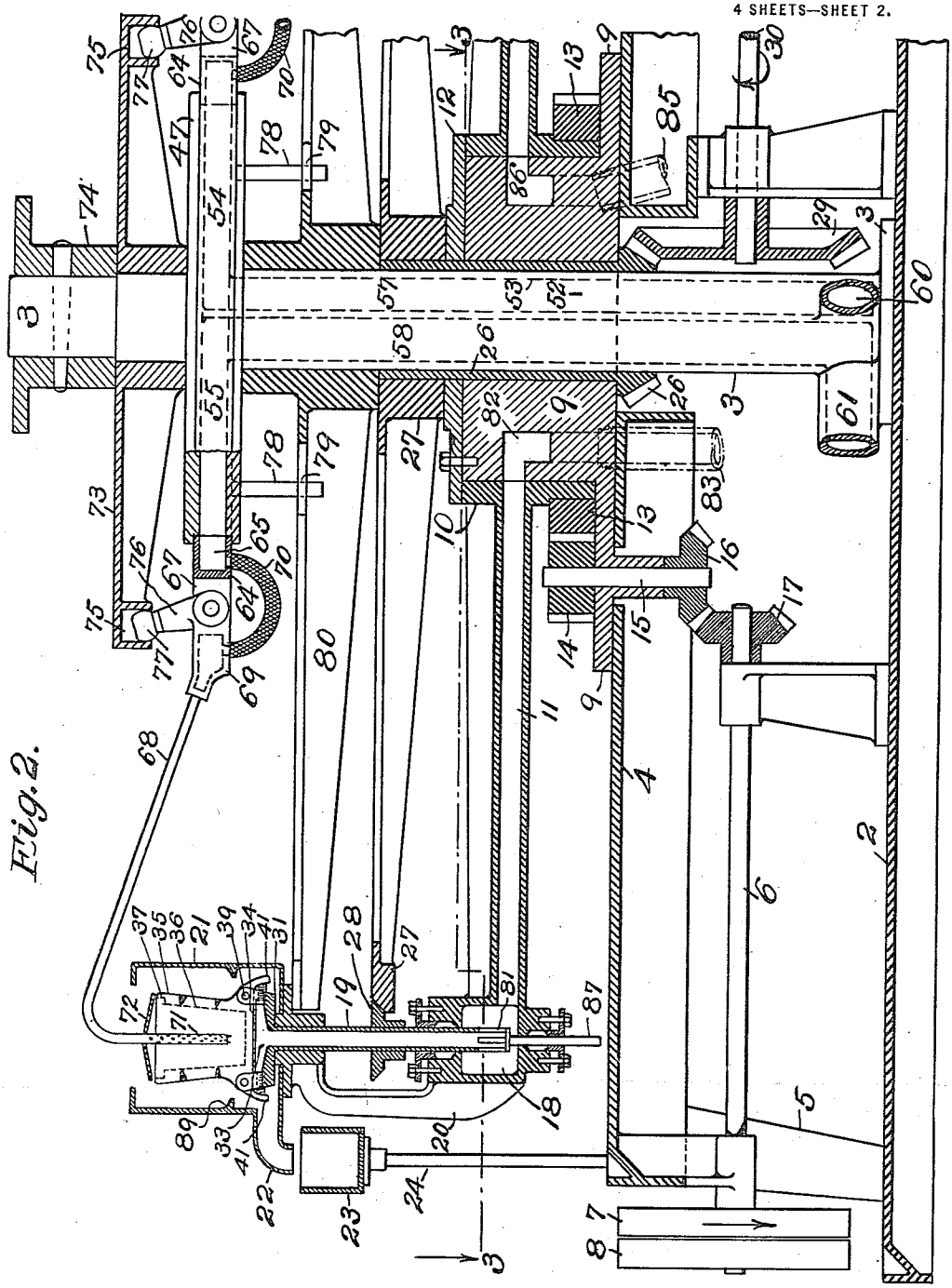


Fig. 2.

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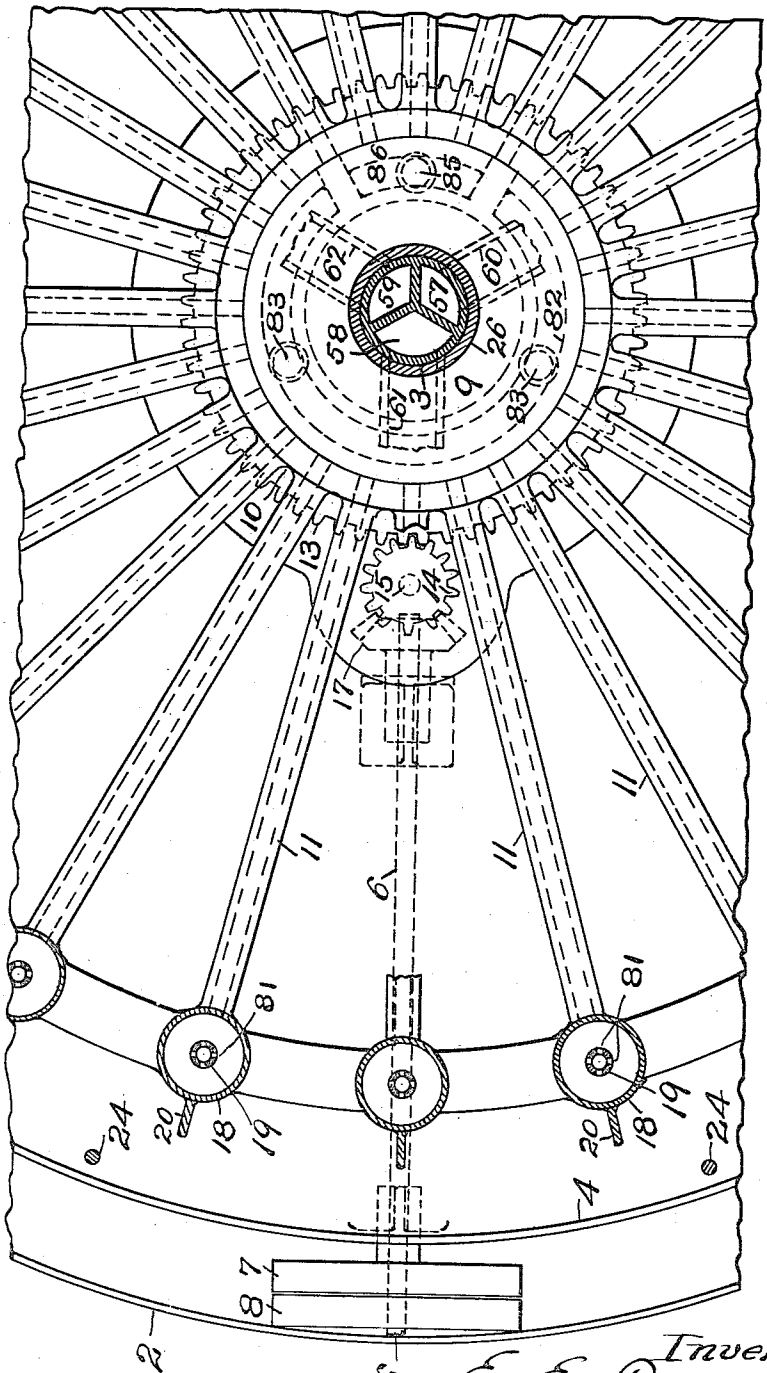
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

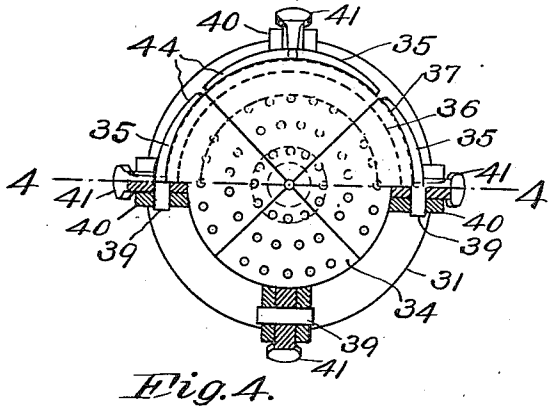


Fig. 4.

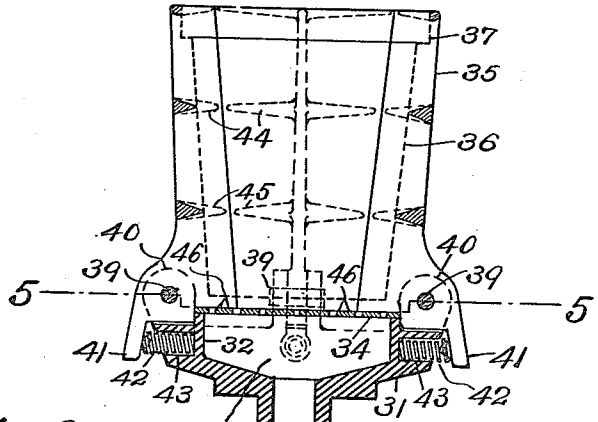


Fig. 6.

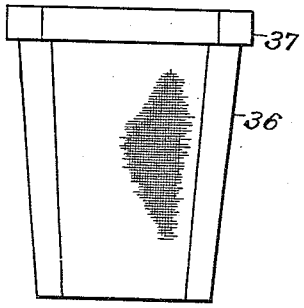
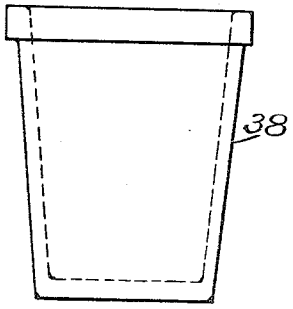
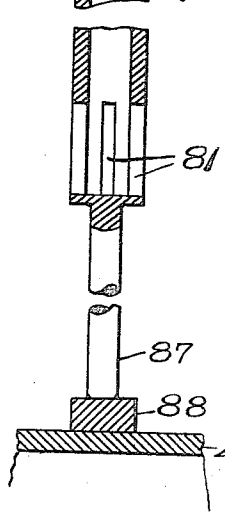


Fig. 7.





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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING PLASTIC ARTICLES.

1,267,632. Specification of Letters Patent. Patented May 28, 1918.

Application filed June 3, 1916. Serial No. 101,608.

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 Plastic Articles, of which the following is a specification.

This invention relates to a machine for making plastic articles. The articles may be of any nature. While in that form of embodiment of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification the machine is intended for forming receptacles, this may not always be necessary, as it is conceivable that in some cases the article could be flat, and in this case it could be used in various ways, for example in building. I mention this fact to indicate that the invention is not intended to be restricted to any particular use, although it is primarily utilized for forming receptacles. A receptacle made by the machine can be employed in different ways for illustration as a milk bottle or in fact a container for any desirable purpose. As will be clear the plastic substance may be of any convenient nature, paper pulp being eminently satisfactory, and when paper pulp is employed, this may be any one of several kinds. As a matter of preference, there is used in the production of the product several different grades of pulp, and in some articles such as containers of several types, this is of advantage. For instance in a milk bottle, I may form the core or body of the bottle of low grade pulp, while the inside and outside are of better grades, and yet, if necessary, different from each other. By the machine I can in a rapid, efficient manner, obtain a plastic or equivalent object, the machine having means which in some instances might be omitted, for drying the pulp, so that the product when discharged is virtually in marketable or commercial condition.

Referring to said drawings:

Figure 1 is a top plan view of part of a machine involving the invention.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a vertical section of a mold and its adjuncts, the section being on the line 4—4 of Fig. 5.

Fig. 5 is a sectional plan view of the parts shown in Fig. 4, the section being indicated by the line 5—5 of said Fig. 4.

Fig. 6 is a detail view in elevation of part of the mold construction of the sieve or screen thereof, and

Fig. 7 is a like view of a receptacle or container made by the machine.

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

The different parts of the machine may be supported in any desirable manner, the framing for this purpose as illustrated involving in its construction the base or bed plate 2. From this base or bed plate rises the column, mast or upright 3, rigidly secured to the base or foundation plate in any suitable manner. Said column or upright is in the present instance stationary and will be hereinafter more fully described. As a part of the framing is a second plate or shelf as 4 located above and spaced from the foundation plate 2 as shown best in Fig. 2. The auxiliary plate or shelf 4 as represented is furnished with several pendent legs 5 attached in some suitable way to the foundation plate 2.

Certain of the parts are moved and the necessary motion of some of them may be secured in any convenient manner, for instance through the agency of the shaft 6, supported by suitable bearings carried by the two plates 2 and 4. This shaft 6 may be driven in any desirable way, for example by the pulley 7, fastened thereto and the normal direction of rotation of which is indicated by the arrow applied thereto in Fig. 2. In addition the shaft 6 carries the loose pulley 8 onto which the driving belt (not shown) can be shifted when necessary to stop the parts driven by said shaft.

Surmounting the plate 4 approximately centrally thereof and connected thereto in some convenient way is the bearing 9 (Fig. 2), the central reduced portion of which receives around it the band or annular member 10 from which radiate the arms or spokes 11. This band 10 and the spokes 11 present a convenient mold-carrier. While the mold-carrier, therefore, is shown as rotary, it might be subjected to any other motion; as a matter of fact it might in some in-

stances be stationary. The lower edge of the band or annular hub 10 of the mold carrier is supported upon the widened base of the bearing 9 and is held down thereupon by the disk 12 fastened by screws or otherwise to said bearing. The band or hub 10 and radial arms or spokes 11 and therefore the molds carried thereby as will hereinafter more particularly appear, when subjected to motion, may be operated in any desirable way, although the means shown for this purpose will now be set forth. Surrounding and suitably connected with the band or hub 10 is a ring gear 13 of spur type. In mesh with the teeth of the ring gear is a pinion 14 fastened to the upper end of the stub shaft 15 sustained by the foot or base of the bearing 9 and equipped at its lower end with a bevel gear 16 in mesh with a coöperating bevel gear 17 on the inner end of the main shaft 6, all as shown in Fig. 2. It, therefore, follows that on the rotation of the pulley 7, the mold carrier to which I have alluded and as a consequence the molds sustained thereby will be revolved.

The arms or spokes 11 constitute ducts, being for this purpose hollow or tubular; the reason for this will be hereinafter set forth. Each arm terminates in a head or chambered body 18 and through each head projects a hollow spindle 19. The spindles 19 extend entirely through the respective heads or chambered members 18, the latter having gaskets to prevent leakage by way of the spindle openings therein. Rising from each head 18 is an upright 20, the spindles 19 being supported by hubs on the overhanging portions of the uprights.

Sustained by the hubs of the respective uprights or arms 20 are vessels 21 which contain the respective molds. Each vessel is provided with an outlet as shown in the form of a spout 22, the spouts leading or discharging into the annular pan 23 inclosing the several uprights or arms 20 and fastened to the upper ends of posts 24 rising from and suitably connected to the upper plate 4. I might state that in the present instance these spouts are intended to discharge surplus water thrown off from the articles in the vessels 21 by centrifugal action or it might be otherwise, such water entering the annular pan 23 and being discharged therefrom by gutters as 25 or otherwise. The spindles 19 are in the organization illustrated rotary, and I prefer that they be rotated at a high speed so as to insure excess water in the articles carried by the respective spindles being centrifugally thrown off. To effect this particular rotation any desirable means may be provided.

Surrounding the upright or mast 3 is the elongated hub of a gear 26. The upper portion of this elongated hub is received within the hub of the driver 27 (Fig. 2) of friction type and large diameter. This friction driving wheel has a beveled periphery to engage the correspondingly shaped peripheries of the friction wheels 28 fastened to the respective spindles 19 between the ends thereof. In mesh with the teeth of the bevel pinion 26 is a bevel gear 29 fastened to the shaft 30 supported by a suitable bearing on the bed plate 2. This shaft 30 can be driven by belting or otherwise, its direction of rotation being indicated by the arrow in Fig. 2. When, therefore, the shaft 30 is rotated, it follows that through the described intervening parts the respective spindles 19 will be rotated at a high velocity.

I will now describe one mold and its accessories, and in this connection reference may be had to Figs 2, 4 and 5. The spindle 19 is provided with a cap piece 31 from which rises the annular flange 32, the chamber or cavity 33 within the flange having, of course, communication with the bore of the spindle. This flange 32 constitutes a suitable support for the perforated plate 34 shown as being of annular form. The plate 34 is of sectional form as illustrated, consisting of four segments, and with the inverted tapered hollow member 35 constitutes the mold receiver, the mold being designated by 36. The mold is of a shape corresponding with that of the body or casing 35 of the mold receiver and generally consists of comparatively fine-mesh fabric provided with a flanged upper end 37 when the article as 38 (Fig. 7) is to be formed with a marginal flange.

The receiver body 35 is of sectional form the sections of the base plate 34 being connected with the respective sections of the body 35. The sections of the body are pivoted as at 39 between the branches of the forked lugs 40, rising from the marginal portion of the cap piece 31. Said sections of said body or casing 35 have depending projections 41 acted on constantly by coiled springs 42 fitted in sockets 43 in the circumferential portion of the cap piece 31. The springs 31 constantly press the projections 41 outwardly so as to normally hold the side edges of the sections of said body 35 and bottom or plate 34 in abutment, so that the receiver is virtually normally a one-piece part. The sieve or mold 36 is fitted within the receiving body 35, the latter having interior ribs or fins 44 and 45 against which the outer surface of the mold fits to hold the mold upright within said body 35 with the upper surfaces of the two flush and yet with the outer surface of the mold spaced or separated from the inner surface of the body 35. The lower set of ribs 45 extend farther inward than the upper set 44 as will be obvious. The ribs are generally secured to the sieve or mold 36 for example by brazing.

The sieve 36 is also of sectional form, its sections being connected with the respective sections of the body part 35 and base plate 34. From the base plate 34 may rise pins 46 brazed or otherwise suitably connected with the sections of the mold 36. The bottom of said mold is spaced or separated from the base plate 34.

Pulp is supplied into the upper open sides of the respective molds 36 in some convenient way, pipes being shown for this purpose, although the result might be otherwise secured. As hereinbefore noted, the finished pulp article consists preferably of several grades of pulp. As will be clear there may be instances where there might be only one grade; as a matter of fact it is not always necessary that pulp be utilized, because the invention is broader than this, comprehending the use broadly of any plastic substance. In the case of certain types of containers, as I have already observed, it is desirable that different qualities of pulp be used in the production thereof. I make provision, therefore, for this in the machine. Initially I will start with one grade; at a subsequent point another grade will be supplied, and if there be others for instance as in the present case, a third, this will be delivered onto the mold or into it at a further stage in the proceeding. I might also state that I use the term "plastic material" in a broad sense. For illustration it is desirable and in fact essential with certain kinds of containers that a waterproofing substance be applied thereto in some cases internally, in others externally, and in still others both. It may be desirable also to apply coloring matter, and this of course, is contemplated by the invention.

Surrounding and suitably fastened to the stationary upright 3 is a head 47 open on the outside and closed top and bottom except as will hereinafter appear. In this head are radial partitions 48, 49, 50 and 51 (see Fig. 1 for example), the partitions 48 and 49 joining at the axis of the head 47 and being connected at their juncture by a web 52 with the web 53 joining the bases of the partitions 50 and 51. The presence of these partitions 48, 49, 50 and 51 produces in the pulp distributing head 47 the chambers or compartments 54, 55 and 56. These chambers 54, 55 and 56 are pulp chambers. In the construction shown pulp of high grade to constitute the exterior of the article, is passed through the chamber 54, while the chamber 55 is intended to receive and discharge low grade pulp which is to constitute the core or body of the article, while high grade pulp to constitute the interior of the article passes through the chamber 56. It will be understood that this pulp distributer 47 is stationary.

I have described the fact that it is peripherally or circumferentially open and that it is closed at the top. It is closed in the bottom except for segmental ports (Figs. 1 and 3 for instance) into which the ducts 57, 58 and 59 extending longitudinally of the mast or upright 3 lead. Opening into the lower ends of the ducts 57, 58 and 59 are pipes 60, 61 and 62 (Fig. 3). The pipe 60 receiving pulp from a suitable source of supply, conducts it to the duct 57, and the latter in turn into the chamber 54 while the pipe 61 supplies pulp to the chamber 55 and the pipe 62 to the chamber 56. The pulp is ordinarily supplied under pressure which may be either gravity or force. It will be clear that the ducts are at the inner corners of the three chambers 54, 55 and 56 as illustrated in both Figs. 1 and 3.

Surrounding the open outer side of the pulp distributing head 47 as shown for example in Figs. 1 and 2 is the ring 64. This ring has on its inner side the pockets 65, each pocket consisting of a body made up of part of the ring 64 and sides and a top and bottom, the tops and bottoms and sides traveling in contact with the opening periphery of the head 47. It will be clear that as the ring 64 rotates, series of pockets 65 will be brought opposite the outlets of the segmental chambers 54, 55 and 56. Those pockets 65 which are in register with the discharge orifice of the chamber 54 will, therefore, receive high grade pulp, while those pockets which are opposite the outlet of the chamber 55 will receive low grade pulp, while the pockets opposite the discharge aperture of the chamber 56 will receive the high grade pulp. Each of the partitions or walls 48, 49, 50 and 51 terminates in a lateral cut off 66, so that when an individual pocket passes from one chamber to another, the supply of one kind of stock is cut off therefrom before the supply of a second character of pulp is supplied thereto as will be hereinafter more particularly set forth.

The ring 64 exteriorly is provided with the external lugs, the projections 67 between each adjacent pair of which is pivoted to the butt of a delivery pipe 68, each of the butts having a chamber 69. As shown the chambers 69 are connected with the pockets 65 by flexible pipes 70 which may for instance be rubber tubing, the pipes 70 being adapted to conduct the pulp from the respective pockets 65 to the respective chambers 69, and from thence along the pulp discharge pipe 68. The pulp discharge pipes 68 terminate in down-set portions provided with perforated nozzles 71 above which are splash-guards 72. In view of the fact that the article being formed is of tapered or inverted frusto-conical shape, it is desirable that the upper portions of the nozzles should discharge a greater volume of pulp than the lower, and this result I can obtain for ex-

ample by having the upper perforations of the nozzles 71 of greater size than the lower as shown for instance in Fig. 2.

As will be clear the discharge pipes are susceptible of swinging movement, this being for the purpose of introducing the nozzles 71 into and then removing them from the respective molds, these actions occurring in proper sequence through some suitable means as will hereinafter more particularly appear. To thus effect the action of the discharge pipes 68 and consequently the nozzle 71, the cam 73 may be provided, this cam being fixed in some convenient manner to the upright or mast 3 and being surmounted by the top 74 pinned or otherwise suitably connected to the top of the mast or upright and having depending lugs connected to the base plate 2. This plate maintains the several parts on the mast in assembled relation. The cam 73 has in its under side near its margins, the race 75 to receive the terminal portions of arms 76 rigid with the butts or shank portions 69 of the respective discharge pipes 68, the terminal portions of said arms consisting as illustrated of anti-friction rollers 77 which as will be apparent are adapted to traverse the cam race 75. The operative part of the cam 73 is adapted to act against the arm 76 through the anti-friction rollers 77 to swing the pipes 68 downward and the nozzles 71 into the molds 36 after the bottom plate 34 and body member 35 have been closed as will hereinafter appear, and just before the pockets 65 come opposite the orifice of the chamber 54, being maintained in such molds until the pockets pass away from the discharge part of the chamber 56. In the present construction the nozzles are raised out of the molds when the pockets come opposite the space between the partitions or walls 50 and 51, and this action of the pipes as will be evident is secured by the cam 73 which lowers and raises said pipe 68 at the necessary times. The ring 64 is rotative and may be turned in any desirable manner. It is shown furnished with pendent pins 78 extending through perforations or holes 79 in the wheel 80. This wheel or spider 80 is connected at the outer ends of its spokes in some suitably rigid manner with the hubs of the upright arms or bearings 20. From this it will be clear that as the hereinbefore described mold-carrier rotates the spider 80 as a result also rotates in unison therewith to effect through the pins 78 the turning of the ring 64, and hence the revolution of the pulp-supply pipes 68.

The spindles 19 and arms 11, as will be apparent, are hollow. The spindles have at their lower ends ports 81 opening into the chambers or cavities of the heads 18. The inner ends of the bores of the arms 11 are adapted to register with the inlet ends of segmental ducts 82 in the bearing 9, discharge pipes as 83 being connected with the delivery end of said ducts. The ducts 82 are comparatively wide in the direction of the circumference of the bearing 9. It follows that the inlet end of said duct 82 is in the nature of a circumferentially-elongated slot in the periphery of the bearing 9 and that the discharge ends of the several tubular arms 11 are for a major part of their rotation or revolution in coincidence or register with these slot inlets. The pipes 83 are connected with a suitable exhaust device such as a fan.

As already stated the hollow reticulated molds 36 are rotated at a rapid velocity, the result being that the excess water of the pulp is thrown through the meshes of the molds and onto the inner imperforate surface of the body members 35, flowing down the latter through the perforations of the base plate 34 into the chamber or cavity 33, then through the hollow spindles 19 into the interiors of the heads 18, then along the pipes 11, the water being drawn therefrom into the duct 82 and then into the discharge or exhaust pipes 83 by the power of the exhauster of whatever character the same may be.

It will be understood that pulp of different grades is successively supplied to each mold in its revolution and that just about the time a nozzle 71 is drawn out of a mold 36, this occurring when the inner end of the coöperating pocket 65 reaches the entering end of the space or chamber 84 between the partitions 50 and 51, the body member 35 is automatically opened or expanded to free the molded article within the mold 36 which obviously is opened upward through the plate 34 so as to lift the molded article entirely from the mold and also effect the final drying. This air or it may be any other suitable agent can be supplied in any desirable manner for instance by way of the pipe 85 (Fig. 2) opening into the passage 86 with the outlet of which the inner ends of the arms or hollow spokes 11 are adapted to register. The spindles 19 have solid extensions 87 projecting through the lower gasketed ends of the hollow heads 18 and which are adapted to ride onto the fixed cam 88 (Figs. 1 and 4) on the upper plate 4 just about the instant a pocket 65 comes into register with the space 84 so that on the continued advance of the parts the spindles 87 will be elevated so as to carry the lugs or projections 41 against the fixed abutments 89 in the vessels 21 and thus spread the containing or body members 35 and the parts connected therewith including the molds 36. This frees the molded

article and while being freed it receives the air jet as already explained. The extensions 87 traverse the cam 88, while the pockets are opposite the space 84, and leave the cam after the pockets pass away from said space 84 and approach the chamber 54, so that the spindles 19 and parts connected therewith can drop and permit the lugs 41 to pass free of the abutments 89 and the consequent closing of the mold parts through the action of the springs 42. Just about the time the mold parts are closed, the nozzles 71 are introduced into the closed molds 36.

I will describe briefly the action following the formation of one receptacle or container, this applying to the others, it being, of course, understood that the various movable parts are in motion. Starting with a pocket 65 opposite the space 84, the annular member 64 revolving will carry said pocket away from the space 84 opposite the outlet of the chamber 47, and when the pocket is opposite said chamber 54, the mold parts having in the meantime been closed and the nozzle 71 having been projected into the mold 36, pulp will pass from the chamber 54 into the pocket 65, flexible pipe 20, swinging pipe 68 and by way of the nozzle 71 into the mold 36, the pulp being uniformly distributed against the inner surface and bottom of the mold. The pulp supplied from the chamber 54 is high grade pulp to present the exterior of the receptacle. As the pocket continues to revolve it will be brought opposite the chamber 55 so as to effect in the manner already set forth the supply of low grade pulp into the mold which is directed uniformly onto the pulp already deposited. Further on the pocket being described will be brought opposite the chamber 56 to effect the delivery into the mold of high grade pulp which is imposed upon the pulp core uniformly interiorly thereof. The pulp is supplied to the pocket as long as it is in register with the discharge orifices of the respective chambers. After the pocket leaves the chamber 56 it is brought opposite the space 84 when as already described the mold parts are opened, the nozzle withdrawn and the air jet supplied. During the direction of pulp into the mold 36, the spindle 19 is being rotated at a high speed to effect the removal of the excess water which is disposed of as explained.

What I claim is:

1. The combination of a revoluble mold, a duct member revoluble with the mold and provided with a nozzle, and means for relatively moving the nozzle into and out of the mold at predetermined points in the revolution of the mold and duct member.

2. The combination of a revoluble and rotative mold, a duct member revoluble with the mold and provided with a nozzle, and means for relatively moving the nozzle into and out of the mold at predetermined points in the revolution of the mold and duct member.

3. The combination of a revoluble mold, a duct member provided with a nozzle, means for relatively moving the nozzle into and out of the mold at predetermined points in the revolution of the mold, and means for supplying the duct member with different grades of material at predetermined points in the revolution of the mold.

4. The combination of a revoluble mold, a duct member revoluble with the mold and provided with a perforated nozzle, and means for operating the duct member to effect the movement of the nozzle into and out of the mold at predetermined points in the revolution of the mold and duct member.

5. The combination of a revoluble mold, a duct member provided with a nozzle, means for relatively moving the nozzle into and out of the mold at predetermined points in the revolution of the mold, and means for supplying different grades of pulp to the duct member for the supply by way of said nozzle into the mold and also at predetermined points in said revolution.

6. The combination of a mold, and means for supplying different grades of pulp to the mold at predetermined points.

7. The combination of a hollow mold, and means for supplying different grades of pulp into the mold at successive points.

8. The combination of a hollow mold, means for supplying different grades of pulp into the mold at successive points, and means for positively removing surplus water from the pulp while in the mold.

9. The combination of a traveling mold, a duct member to travel with the mold and provided with a nozzle, and means for relatively moving the nozzle into and out of the mold at predetermined points in the travel of the mold and duct member.

10. The combination of a series of rotary molds, means for effecting the travel of the rotary molds, a duct member provided with a nozzle common to each mold the duct members being movable with the molds, means for relatively moving the nozzles into and out of the coöperative molds at predetermined points in the travel of the molds and duct members, and means for supplying the duct member with pulp material.

11. The combination of a hollow perforated mold, means for supplying pulp into the mold, means for opening the mold, and means for directing a drying agent under force against the mold approximately at the point it is opened.

12. The combination of a hollow perforated mold, means for supplying pulp into the mold, means for opening the mold at a

predetermined point after the pulp article is formed, and means for directing compressed air into the mold approximately at the time it is opened.

13. The combination of a mold, means for supplying different grades of pulp to the mold at predetermined points, and an exhaust duct connected with the mold.

14. The combination of a mold, means for effecting the travel of the mold, means for supplying pulp into the mold during its travel, means for rapidly rotating the mold to effect centrifugally the removal of water therefrom and while the mold is traveling, means for opening the mold at a predetermined point in the travel thereof, and means for directing a drying agent into the mold approximately at the point it is opened.

15. The combination of a hollow mold, means for supplying pulp to said mold, a duct to which the mold is connected, means for effecting the movement of the mold, means for connecting exhaust means to the duct at one point in the travel of the mold, means for opening the duct at another point in the travel of the mold, and means for connecting a source of air to the duct approximately at the point the mold is opened.

16. The combination of a pulp-distributing head, an annular member surrounding the head, the annular member having a pocket and the head having a chamber to contain pulp, means for effecting a relative movement of the head and the annular member to bring the pocket into register with the chamber, a mold, and means for conducting the pulp from the pocket to the mold.

17. The combination of a pulp-distributing head, a member fitted to the head and having a pocket, the head having a chamber to contain pulp, means for effecting a relative movement of the head and the said member to bring the pocket into register with the chamber, a mold, and means for conducting pulp from the pocket to the mold.

18. The combination of a pulp-distributing head, a member in coöperative relation with the head, said member having a pocket and the head having chambers to contain pulp of different grades, means for effecting a relative movement of the head and said member to bring the pockets successively into register with said chambers, a mold, and means for conducting pulp from the pocket to the mold.

19. The combination of a pulp-distributing head, an annular member surrounding the head and having chambers to contain material, the annular member having a pocket, means for effecting a relative rotation of the head and the annular member to bring the pocket into register successively with said chambers, a mold, and means for conducting material from the pocket to the mold.

20. The combination of a pulp-distributing head, an annular member surrounding the head, the annular member having a pocket and the head having a chamber to contain pulp, means for positioning the pocket to receive pulp from the chamber, a mold, and means for conducting pulp from the pocket to the mold.

21. The combination of a pulp-distributing head, an annular member surrounding the head, the annular member having a pocket, and the head having a chamber to contain pulp, means for positioning the pocket to receive pulp from the chamber, a swinging pipe provided with a nozzle, connected with said annular member, and a flexible tube connecting said pipe and pocket.

22. The combination of a pulp-distributing head having chambers, an annular member surrounding the head, means for rotating the annular member, the annular member having pockets on its inner side adapted to register in series with the respective chambers on the rotation of said annular member, and pipes provided with nozzles, supported by said annular member and in communication with the respective pockets.

23. The combination of a pulp-distributing head having chambers, an annular member surrounding said head, having pockets on its inner side, means for rotating said annular member to bring the pockets in registration in series with the respective chambers, swinging pipes provided with nozzles, supported by said annular member, and flexible tubes connecting the respective pipes and pockets.

24. The combination of a pulp-distributing head, an annular member surrounding the head, the annular member having a pocket and the head having a chamber, and means for relatively rotating the annular member and head to move the pocket into and out of registration with the chamber.

25. The combination of a pulp-distributing head having a plurality of chambers, an annular member surrounding the head and provided with pockets on its inner side, means for rotating the annular member to bring the pockets in series into registration with the respective chambers, swinging pipes supported by said annular member and in communication with the respective pockets, said pipes having nozzles, means for automatically swinging the pipes on the motion of the rotary member, and molds into and out of which the nozzles are moved on the swinging of the pipes.

26. The combination of a pulp-distributing head having chambers, an annular member surrounding the pulp-distributing head and having pockets on its inner side, means for rotating the annular member to bring

the pockets into register in series with the respective chambers, swinging pipes provided with nozzles supported by the annular member and in communication with the respective pockets, molds, and cam means acting against said swinging pipes to cause the nozzles to move into and out of the molds on the rotation of said annular member.

27. The combination of an annular head having separate chambers, means for supplying different grades of pulp to the chambers, an annular member surrounding the head and having pockets on its inner side, means for rotating the annular head to bring the chambers into registration in series with the respective chambers, and means for conducting the contents of the pockets therefrom.

28. The combination of a pulp-distributing head having a plurality of chambers, means for supplying pulp of different grades to said chambers, a pocketed member in coöperative relation with the head, means for relatively operating the head and the pocketed member to bring the pockets into registration with the respective chambers, molds, and means for conducting pulp from the pockets to the respective molds.

29. The combination of an annular pan, a plurality of receptacles disposed in annular order, having outlets discharging into said pan, molds in the receptacles, and means for supplying liquid material to the molds.

30. The combination of a rotary carrier, receptacles supported by the rotary carrier, having outlets, molds in the respective receptacles, and means for supplying liquid material to the molds.

31. The combination of a rotary carrier, an annular pan, receptacles supported by the rotary carrier, having outlets opening into the annular pan, the receptacles being arranged in annular order, molds in the receptacles, and means for supplying pulp to the molds during the rotation of said carrier.

32. The combination of a pulp distributing head, a member in working relation with the head, said member having a pocket and the head having a chamber to contain pulp, means for effecting a relative movement of the head and the member to bring the pocket into register with the chamber, a mold, and means for conducting pulp from the pocket to the mold.

33. The combination of a container comprising an imperforate body and a perforated bottom both of sectional form, and a perforated mold in the container spaced from said body and bottom, the mold being in sections connected with the respective sections of the container.

34. The combination of a container comprising an imperforate body and a perforated bottom both of sectional form, a perforated mold in the container spaced from said body and bottom, the mold being in sections connected with the respective sections of the container, means for moving the container and thereby the mold, and means for opening the container and thereby the mold on such movement.

35. The combination of a container comprising a body and a perforated bottom, a rotary hollow spindle having an outlet and supporting said container, and a perforated mold supported within the container and spaced from the body and bottom thereof.

36. The combination of a receptacle having an outlet, a container in said outlet comprising a body and a perforated bottom, a rotary spindle extending into the receptacle and supporting said bottom, and a perforated mold supported in the container and spaced from the body and bottom thereof.

37. The combination of a receptacle, a rotary hollow spindle having an outlet and extending into the receptacle, a container in the receptacle having a body, and a perforated bottom both in sections, a mold supported by the container within the same, the mold being in sections connected with the respective sections of the container, means for imparting an endwise movement to the spindle with respect to the receptacle, and means in the receptacle for effecting the opening of the container and the mold on said endwise movement.

38. The combination of a rotary hub provided with radial hollow arms terminating in hollow heads, hollow spindles supported by said heads and having ports in the heads, means for rotating the carrier and for independently rotating the spindles, molds supported by the spindles, and means for supplying pulp into the molds during the rotation of the carrier.

39. The combination of a traveling carrier receptacles supported by said carrier, a stationary pan, the receptacles having outlets opening into the pan, molds in the receptacles, and means for supplying pulp to the molds during the movement of the carrier.

40. The combination of a rotary carrier, rotary molds supported by the carrier, means for rotating both the carrier and the molds at a higher velocity than the carrier and provided with ducts terminating in nozzles, means for causing the nozzles to enter and leave the molds at predetermined points in the rotation of the carrier, and means for supplying said ducts with pulp when the nozzles are in the molds.

41. The combination of a standard, a carrier rotative about said standard, a pulp-distributing head fixedly supported by the

standard and having a plurality of chambers, means for supplying pulp of different grades by way of said standard to said chambers, a member rotated about said head and having pockets on its inner side to register in series with the respective chambers on the rotation of said members, swinging ducts connected with said member and in communication with the respective pockets, the ducts having nozzles, molds supported by the carrier, and means for swinging said ducts on the motion of the member which supports them for causing the nozzles to move into and out of the molds.

42. The combination of a rotary hub provided with radial hollow arms terminating in hollow heads, hollow spindles supported by said heads and having ports in their heads, means for rotating the carrier and for independently more rapidly rotating the spindles, molds supported by the spindles, means for supplying pulp into the mold during the rotation of the carrier, means for imparting end-wise movement to the spindles, and means for opening the molds on the endwise movement of the spindles.

43. The combination of a rotary carrier, spindles supported by the carrier, means for rotating the carrier and for independently more rapidly rotating the spindles, molds supported by the spindles, means for supplying pulp into the molds during the rotation of the carrier, means for imparting endwise motion of the spindles during the rotation of the carrier, and means for opening the molds on the endwise movement of the spindle.

44. The combination of a rotary hub provided with arms, spindles rotatively supported by and projecting from the arms, molds supported by the spindles, means for rotating the carrier and for more rapidly rotating the spindles, cam means for engaging the projecting portions of the spindles to impart endwise movement thereto on the rotation of the carrier, and means for opening the molds on the endwise motion of the spindle.

45. The combination of a pulp distributing head having a plurality of chambers, a member in coöperative relation with the head and provided with pockets, means for effecting a relative movement of said head and member to bring the pockets into register with the respective chambers, a series of molds, and means for conducting pulp from the respective pockets to the molds.

46. The combination of a hollow spindle having a head, a container comprising a perforated bottom and an imperforate body, the bottom being supported by said head and the head having a cavity below the bottom in communication with the interior of the spindle, a reticulated mold supported in the container and spaced from the bottom and body thereof, and a perforated nozzle for delivering pulp into the mold.

47. The combination of a bearing member having passages, a rotary hub surrounding the bearing member, the hub being provided with hollow arms provided with hollow heads and the hub on its rotation bringing the inner ends of the arms into register with said perforations, rotary hollow spindles extending into said heads and having outlets therein, containers having perforated bottoms, supported by the spindles, means for rotating the hub and for independently more rapidly rotating the spindles, a pulp-delivering head having chambers, a rotary pocketed member surrounding the head, the pockets of which are adapted to register in series with the respective chambers on the rotation of said pocketed member, swinging ducts connected with said pocketed member and in communication with the respective pockets thereof, said swinging ducts having nozzles, means for rotating said pocketed member with said hub, and means for acting against the swinging ducts to effect the movement of the nozzles thereof into and out of the molds.

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

EDWARD E. CLAUSSEN.

Witnesses:

L. L. MARKEL,

HEATH SUTHERLAND.