Feb. 5, 1929. 1,701,238

E. P. KENNEDY

MOLD AND METHOD OF EJECTING PULP ARTICLES THEREFROM

Filed Dec. 14, 1927 3 Sheets-Sheet 1

Fig. 1.

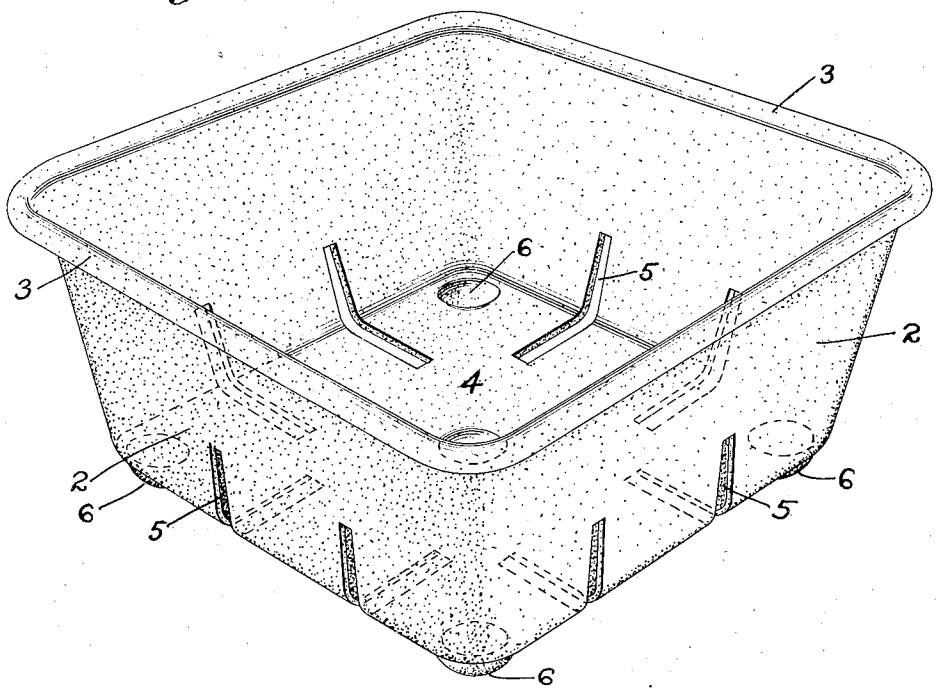
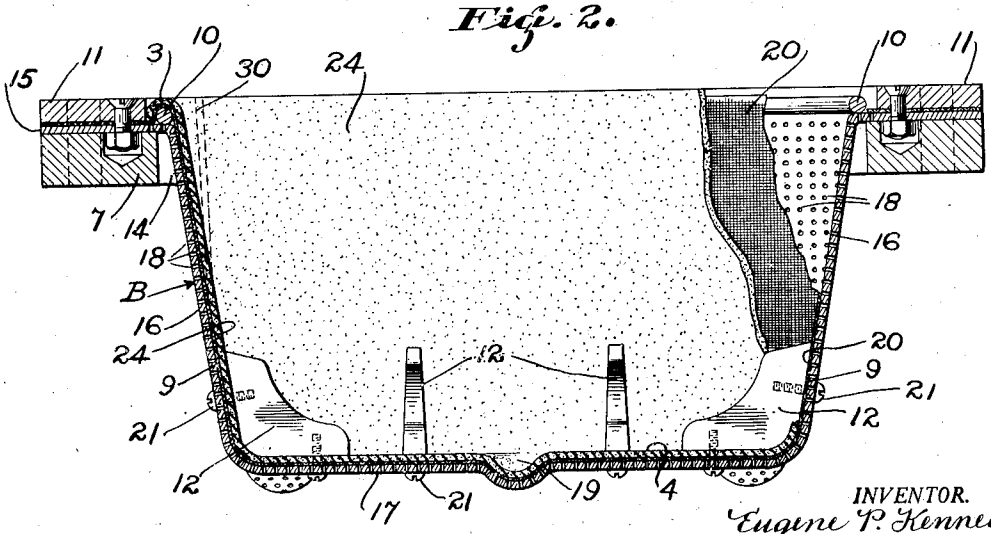


Fig. 2.



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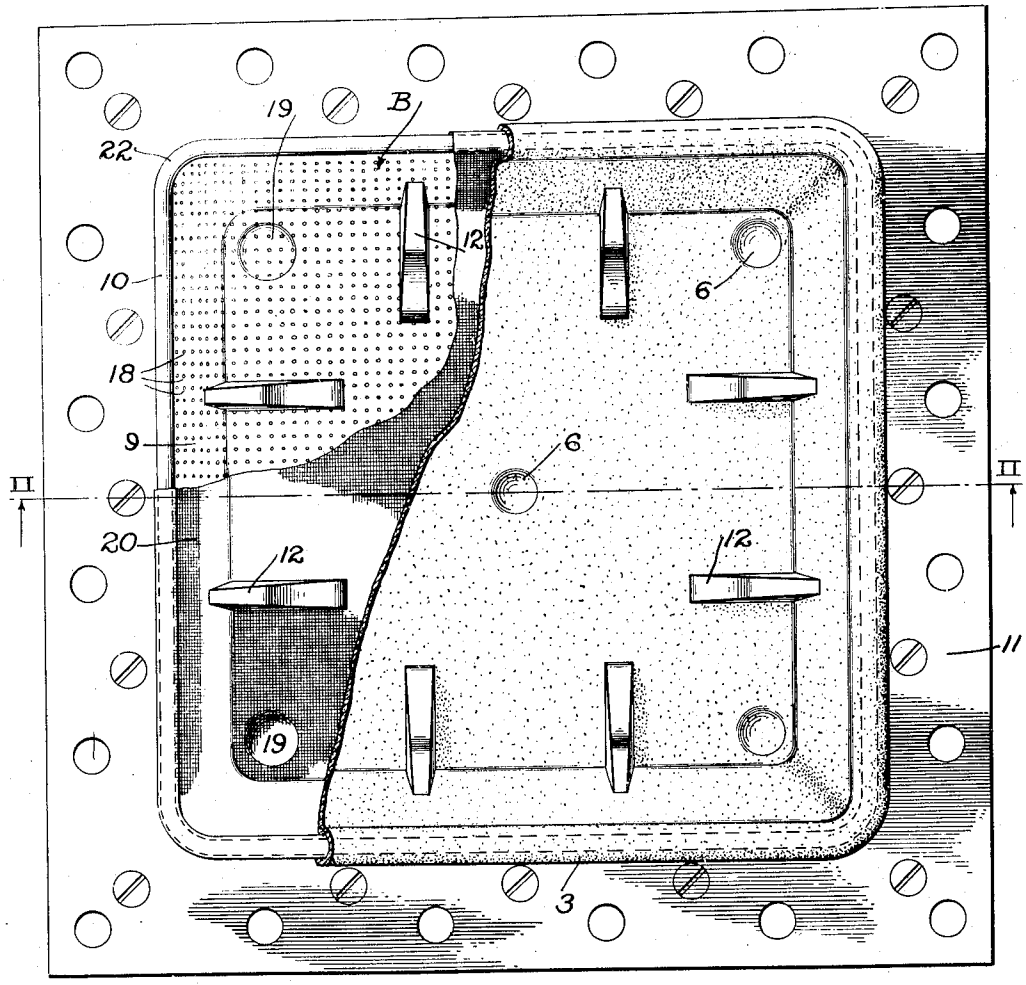
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Fig. 3.



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Fig. 4.

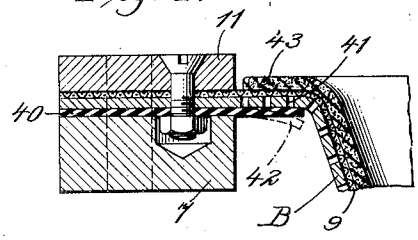


Fig. 5.

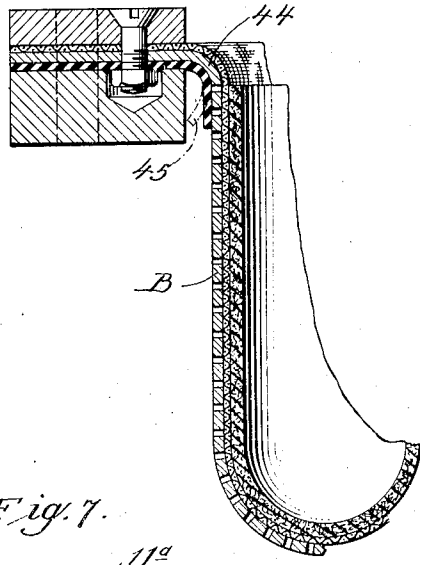


Fig. 6.

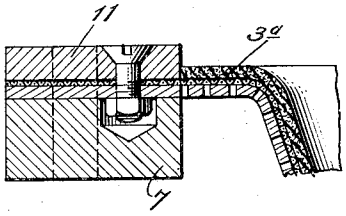


Fig. 7.

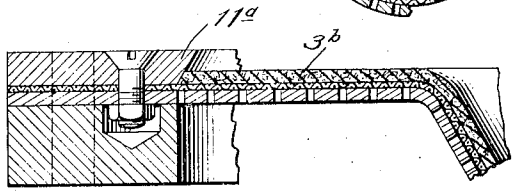
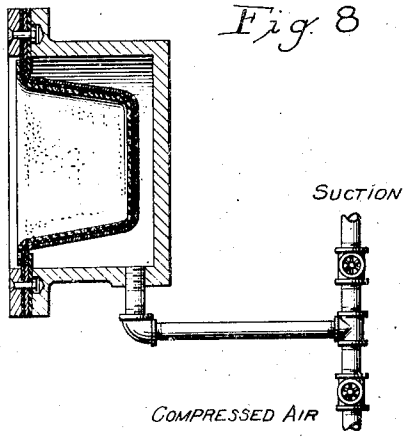


Fig 8



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UNITED STATES PATENT OFFICE.

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MOLD AND METHOD OF EJECTING PULP ARTICLES THEREFROM.

Application filed December 14, 1927. Serial No. 240,066.

This invention relates to molds, and particularly that type of mold which is used in conjunction with the forming of pie plates, baskets, bottles, containers, etc., which are made from paper pulp and the like.

The object of the present invention is to generally improve and simplify the construction and operation of molds of the character described; to provide a mold which may be adapted to numerous shapes; to provide a mold in which a pulp article may be quickly formed and dried, and further, to provide a method whereby ejection of the pulp articles when completed is insured.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a perspective view showing a berry basket formed of wood pulp or the like, or, in other words, the completed article produced by one of the molds forming the subject matter of the present application.

Fig. 2 is a cross-section of a mold taken on line II—II of Fig. 3.

Fig. 3 is a plan view of a mold partly broken away.

Fig. 4 is a modified form of the mold, which is provided with means for retarding release of the flange portion of the pulp container during the ejecting period.

Fig. 5 is another modification, showing the same type of retarding mechanism as that disclosed in Fig. 4.

Fig. 6 and Fig. 7 are modified forms of the structure shown in Fig. 2 and Fig. 3.

Fig. 8 is a diagrammatic view showing one method of applying suction to the mold, and delivering compressed air thereto.

For the purpose of clearly describing the mold a specific form of pulp container will be described, to wit, a square shaped comparatively deep berry basket such as illustrated in Fig. 1. This basket as shown consists of side sections 2 having an upper annular rounded flange 3 and a bottom section 4. The sides and bottom sections are slotted as at 5 to provide ventilation, and the bottom section is provided with a semi-spherical protuberance or feet 6 which serve the function of maintaining the bottom section of the basket in elevated position with relation to a support.

The manner of forming the annular flange 3, and the advantages obtained during the molding operation and in the finished product is one of the important features of the invention; the slotting of the basket is also an important feature and will be more fully described.

The mold proper consists of the following members, a supporting plate 7, a main form section B, a pulp screen or forming surface 9, a wire rod 10, a clamping plate 11 and a series of slot forming lugs 12. The supporting plate 7, is, in this instance, square in shape and provided with a central opening 14 of similar shape. The main form B is received by this opening, and it is provided with an annular flange 15 which rests on top of the supporting plate 7 and is clamped or secured thereto by means of the plate 11. The main form is preferably constructed of copper or a like metal. It consists of the upper annular flange 15, side sections 16 and a bottom section 17. The sides and bottom section, and a small portion of the flange 15, are perforated as indicated at 18, and the bottom section is depressed at a number of points as shown at 19 to form the feet of the basket as will hereinafter be described.

The inner surface of the main forming section is lined with a fine mesh screen 20 and this screen is secured in position by means of the slot forming lugs 12 and by the clamping plate 11, the screen 20 being rigidly secured against the side and bottom surfaces of the main form section 9 by the lugs 12 as they are secured to the main forming section by means of screws 21.

The wire member 10 is circular in cross section and it is square in shape and is provided with rounded corners as indicated at 22 when viewed from a plan view, see Fig. 3. That is, the wire surrounds the upper peripheral edge of the main form. The pulp forming screen passes over the wire 10 and then down in under the plate 11 which clamps and secures the same. The pulp screen is thus held in a taut rigid position against the inner surface of the main form, not only by the lugs 12, but also by the clamping plate 11. The wire 10 is interposed between the main form and the pulp screen for the following reasons. First, it permits the formation of a rounded annular flange on the upper edge of the basket or pulp container as indicated at 3, secondly, it reinforces and strengthens the basket when completed, and third, it permits ready removal of the pulp container with relation to the mold during the manufacturing operation.

The mold as described and illustrated may

be used in conjunction with a number of pulp forming and manufacturing machines but, it is, in this instance, particularly adapted for use in connection with the type of machine shown in Patent Number 1,621,671 entitled "Pulp forming machine" issued to Keenan et al., March 22nd, 1927. The machine illustrated in this patent consists of an annular drum which is composed of a plurality of connected castings. These castings are hollow and each is provided with an opening to receive the mold, the molds being secured in the openings by means of the supporting plate 7 which is applied to the respective castings.

The drum supporting the castings, or of which it is constructed, is continuously rotated and during this rotation the molds are submerged in a pulp vat. A suction action is applied to the respective castings during the submersion period and the pulp is accordingly applied to the screen 20 as indicated at 24. A coating of pulp of any desired thickness is applied by increasing or decreasing the period of submersion, or the amount of suction applied, suffice it to say, that a uniform dense coating of pulp is applied in this manner. This coating is later dried directly on the mold by sucking warm air therethrough and it is finally ejected by means of air under pressure.

Heretofore considerable trouble has been encountered in ejecting pulp articles of this character by means of air under pressure as the outer ends of the side sections had a tendency to move inwardly and assume the dotted line position shown at 30 in Fig. 2. The air under pressure would thus freely escape through the perforations which were uncovered by inward movements of the sides of the pulp container and the remaining portions of the container would adhere to the pulp screen to such an extent that no matter how much air under pressure would be applied the pulp container would not be released as the air would freely escape.

Applicant accordingly conceived the idea of forming the annular flange 3. This flange sealed the lower or open end of the pulp container when formed to such an extent that when air under pressure was applied to eject the pulp container, the bottom section would first be free and then the sides and finally the flange 3 would release and the container would be discharged. Thus, by forming the annular flange it was found that the difficulty of removing the pulp containers was entirely overcome, and, secondly, it was found that the pulp container was materially reinforced and strengthened by the flange.

The slots 5 shown in the completed article, are as previously stated, produced by the slotting lugs 12. These lugs serve two functions, first that of forming the slots in the sides and bottom of the completed berry basket, and, secondly that of securing the pulp screen against the sides and bottom of the main forming section. The lugs have a width at the base portion equal to the width of the slots to be formed. They otherwise taper as shown in Fig. 2 so as to permit a gradually increasing clearance when the completed pulp container is being discharged from the mold. The slots are formed by the lugs due to the fact that they cover or blank, portions of the pulp screen thereby preventing pulp from being applied when the screen is subjected to suction during the submersion period in the pulp vat. The protuberances or feet on the basket are formed by the depression 19 in the pulp screen and in the main forming section. In fact, any irregular surface may be formed in this manner.

In Figs. 2 and 3 I have illustrated and described a form of mold in which a semi-circular or hook shape flange is formed around the outer edge of the pulp container, the function of the flange being first, that of reinforcing the edge of the pulp container, and secondly that of temporarily securing or retarding release of the flange during the ejecting operation.

In Fig. 6 I have shown a modified form of flange. The flange is flat, and is indicated at 3^a. In this instance the flange on the pulp container abuts the inner face of the clamping plate 12.

After the pulp has been formed and dried, it is found that the outer edge of the flange frictionally engages the inner face of the clamping plate, thus when the ejecting operation takes place, sufficient friction is formed between the outer edge of the flange and the inner face of the clamping plate to retard ejection, thereby insuring complete release of all other surfaces of the pulp article before the flange is released. Where a large flange or flap is formed, as shown at 3^b (see Fig. 7) I find it advantageous to form an inclined inner surface on the clamping plate as indicated at 11^a. This inclined face does not only frictionally retard release of the outer edge of the flange, but it also forms a mechanical retarding device.

By referring to Figs. 4 and 5, it will be noted that another method is employed for retarding release of the flange or the outer end of the pulp container. In Fig. 4, 11 indicates the clamping plate, 7 the supporting plate, B the main form section, and 9 the screen or forming surface. A sheet of comparatively thin rubber, such as indicated at 40, is interposed between the main supporting plate 7, and the flange of the main forming section B. This flap projects in under the flange portion of the form section B, and it will be noted that it covers three or more of the perforations 41, formed therein. During the suction operation when the pulp is being

applied, the flap bends inwardly as indicated by dotted lines at 42. The water may thus freely enter, and the pulp will be applied on the exterior of the screen 9 to form the flange 43. The flap also assumes the dotted line position indicated in 42, when warm air is being pulled through the pulp and the mold, but the flap moves back into engagement with the under side of the main form B, when air pressure is applied to eject the dried pulp container. Such movement of the flap closes off the perforations 41, and comparatively little, if any, air pressure is applied to the flange 43. It can thus be seen that the bottom and the sides of the pulp container will be freed by the air pressure, before the flange 43 is released. In fact, it will not be released until the air has completely released the bottom and side sections, and tends to bulge the same outwardly.

In Fig. 4, I have shown the retarding device, to wit, the rubber flap applied to a type of pulp container which employs a flange.

In Fig. 5 I have shown the same type of rubber flap applied to a pulp container which does not require a flange. The perforations in the main forming section B, are stopped off at the point indicated at 44. The rubber flap overlies the uppermost perforations, but it forms no obstacle when suction action is applied, as it will naturally bend inwardly as indicated by dotted lines at 45. The moment, however, that the pulp container has been completely formed and dried, and the air pressure is applied to eject the same, the flap will move inwardly and close off the uppermost perforations, and all portions of the pulp container will thus be freed or released with relation to the screen before the upper end is released.

I have accordingly provided a method of retarding release of either the upper end of the pulp container or the flange thereof, which is not dependent upon friction or mechanical interlocking devices as shown, for instance, in Figs. 2 and 7.

Both forms of the invention are more or less specifically illustrated. I accordingly wish it understood that various changes may be resorted to within the scope of the appended claims. It should be understood that the materials and finish of the several parts employed may be such as varying conditions may demand, or the experience of the manufacturer may dictate.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A mold comprising a main form section provided with an annular supporting flange, said form and a portion of the flange being perforated, a supporting member for the flange, an annular rod resting on the perforated portion of the flange, a pulp screen forming a covering for the perforated main form, said screen also covering the rod and the perforated portion of the flange, and clamping means securing the screen with relation to the main form and the rod.

2. A mold comprising a main form section provided with an annular supporting flange, said form and a portion of the flange being perforated, a supporting member for the flange, an annular rod resting on the perforated portion of the flange, a pulp screen forming a covering for the perforated main form, said screen also covering the rod and the perforated portion of the flange, clamping means securing the screen with relation to the main form and the rod, and means for blanking portions of the pulp screen.

3. A mold comprising a main form section provided with an annular supporting flange, said form and a portion of the flange being perforated, a supporting member for the flange, a pulp screen forming a covering for the perforated main form, said screen also covering the rod and the perforated portion of the flange, clamping means securing the screen with relation to the main form and the rod, and lugs secured on the pulp forming surface of the screen and blanking portions thereof.

4. A mold of the character described, comprising a forming section, said forming section consisting of side sections terminating in an upper annular flange and a bottom section, said bottom section, side sections and the inner edge of the flange being perforated, a wire rod circular in cross section surrounding the upper inner edge of the flange and resting on the perforated portion of the flange, a pulp screen forming a covering for the bottom section and the side sections and passing over the wire rod and the perforated portion of the flange, a supporting plate for the flange and a clamping plate cooperating therewith to secure the flange of the forming section and the pulp screen with relation to the supporting plate.

5. A mold of the character described comprising a forming section, said forming section consisting of side sections terminating in an upper annular flange and a bottom section, said bottom section, side sections and the inner edge of the flange being perforated, a wire rod circular in cross-section surrounding the upper inner edge of the flange and resting on the perforated portion of the flange, a pulp screen forming a covering for the bottom section and the side sections and passing over the wire rod and the perforated portion of the flange, a supporting plate for the flange, a clamping plate cooperating therewith to secure the flange of the forming section and the pulp screen with relation to the supporting plate, and a plurality of tapering lugs engaging the pulp forming surface of the screen and secured to the main form.

6. A mold comprising a screen consisting of sides and a bottom section, an annular flange forming a continuation of the upper portion of the side sections, said flange being substantially semi-circular shaped in cross section, where it joins the side sections, a perforated form supporting the bottom, the sides and the flange of the screen, means for delivering pulp to the screen side of the mold, and means for applying a suction action on the bottom, the sides and flange of the perforated form to form a coating of pulp on the screen.

7. A method of insuring ejection of pulp articles after formation on a screen mold, which consists in subjecting the pulp article to air pressure to release it with relation to the screen, and retarding release of a portion of the surface of the pulp article, during the application of the air pressure, so as to insure complete release of all other surfaces on the molded pulp article, with relation to the mold before release of the portion which is being retarded.

8. A method of insuring ejection of pulp articles after formation on a screen mold, which consists in subjecting the pulp article to air pressure to release it with relation to the screen and during the application of the air pressure, retarding release of the open end of the pulp article, so as to insure complete release of all other surfaces of the pulp article with relation to the mold.

9. A method of insuring ejection of pulp articles after formation on a screen mold, which consists in subjecting the pulp article to air pressure to release it with relation to the screen and during the application of the air pressure, reducing the pressure at the open end of the pulp article to insure complete release of all other surfaces of the pulp article, with relation to the mold.

10. A method of insuring ejection of pulp articles after formation on a screen mold, which consists in subjecting the pulp article to air pressure to release it with relation to the screen and controlling the air pressure applied to the pulp article so that it will cause release of all surfaces of the pulp article before the edge of the pulp article is released.

11. A method of insuring ejection of pulp articles after formation on a screen mold, which consists in subjecting the pulp article to air pressure to release it with relation to the screen and during the application of the air pressure, gripping the outer end of the pulp article so as to insure complete release of all of the surfaces of the pulp article with relation to the mold, before the open end is released.

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