March 7, 1939. H. V. MITCHELL 2,149,878

PULP MOLDING

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Fig. 1

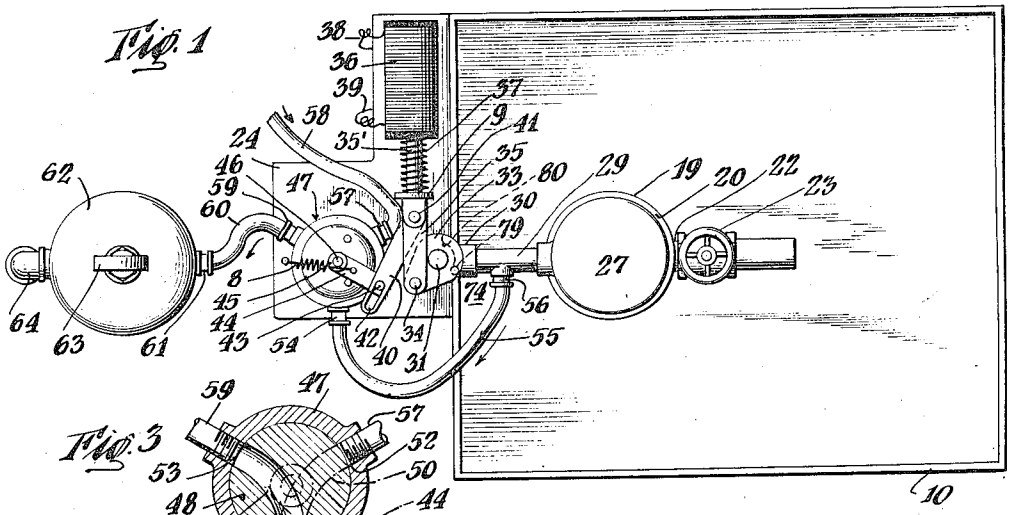
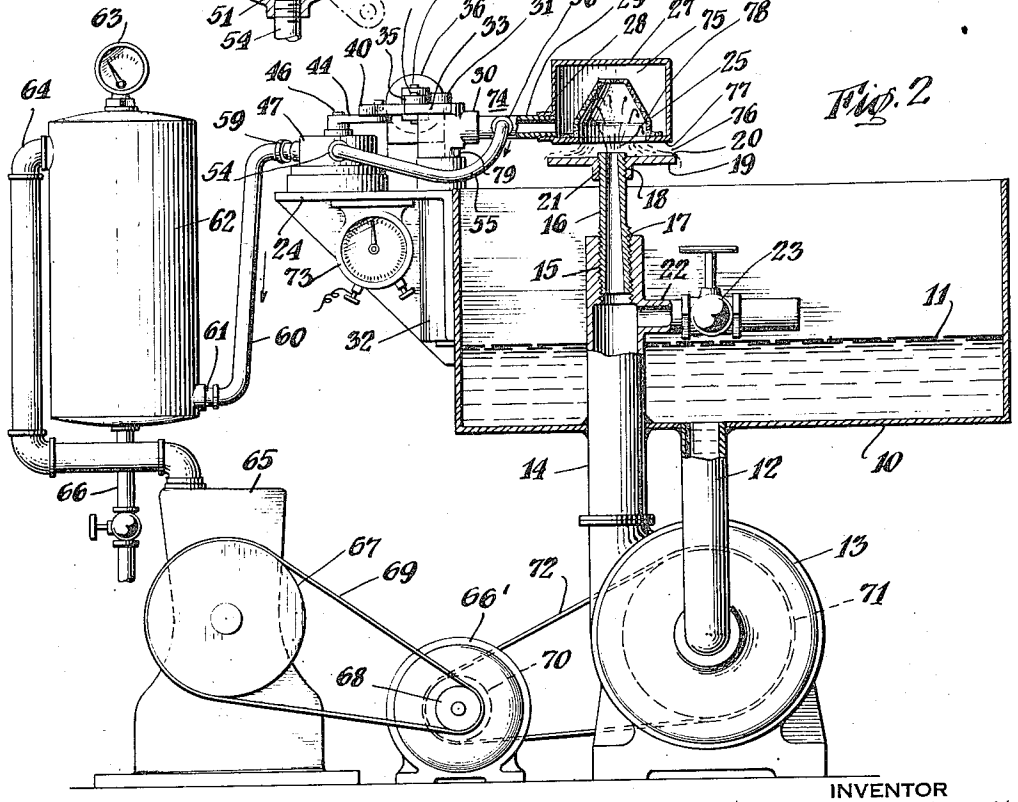


Fig. 3

Fig. 2



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Fig. 4

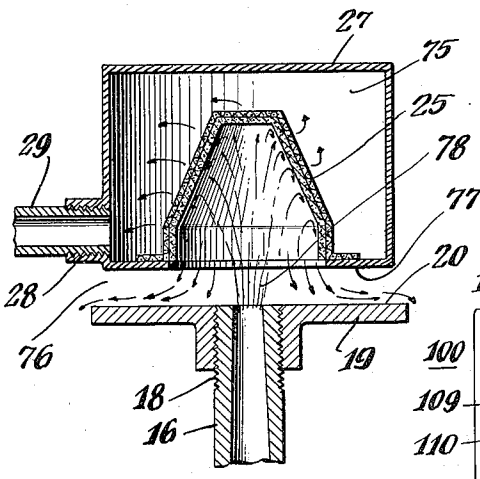


Fig. 5

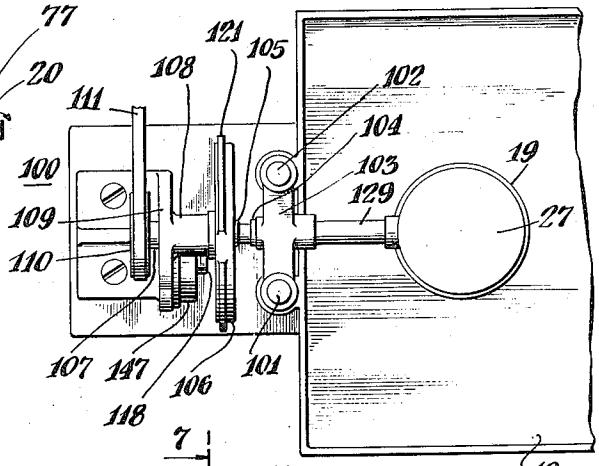


Fig. 7

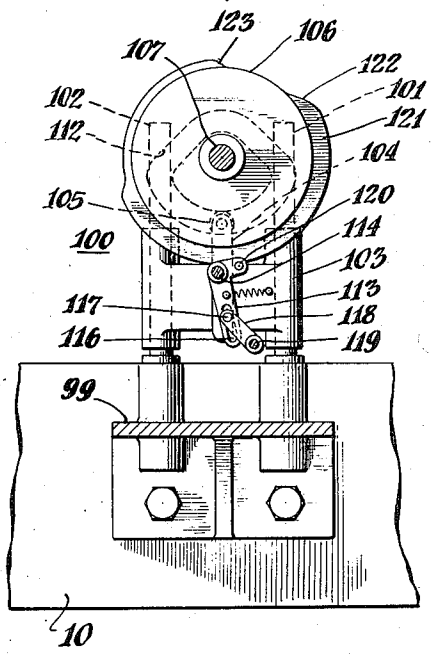
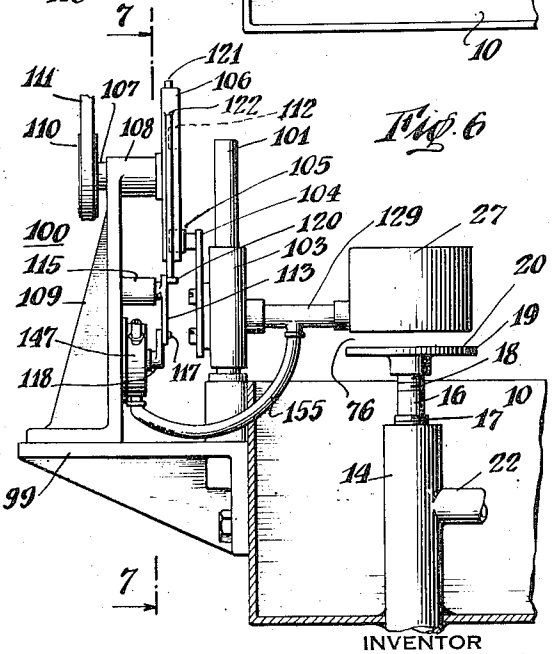


Fig. 6



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PULP MOLDING

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Fig. 8

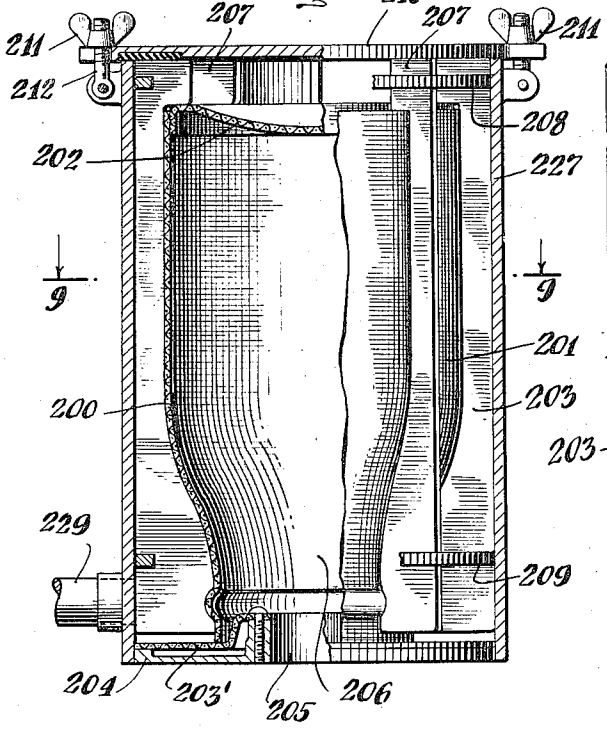


Fig. 10

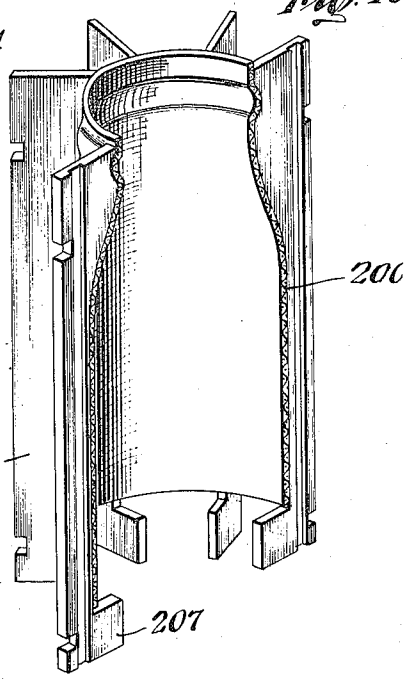
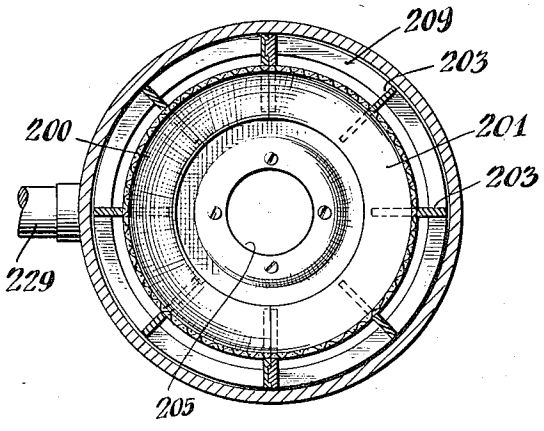


Fig. 9



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Patented Mar. 7, 1939 2,149,878

UNITED STATES PATENT OFFICE

2,149,878

PULP MOLDING

Harvey V. Mitchell, Massillon, Ohio

Application August 27, 1936, Serial No. 98,181

15 Claims. (Cl. 92—54)

This invention relates generally to pulp molding and more particularly to a process and apparatus for producing pulp articles molded to ultimate shape without the prior formation of flat sheet stock.

In accordance with the invention, articles may be molded with extremely high speed, which is a requisite to meet the demands of cheapness in commercial production. The articles capable of being produced may be hollow and have irregular shapes. Furthermore, the invention lends itself admirably to the production of hollow containers of relatively thin walls, both with and without restricted openings. Or, if desired, articles having thick walls may be produced.

Among the various features of the invention is the production of containers having a smooth interior surface. This is accomplished without undue loss in speed by a method hereinafter to be described in more detail, whereby the stock from which the articles are produced is introduced into a foraminous mold in a stream under a controlled velocity head. The foraminous mold is surrounded by a jacket in which is maintained a controlled sub-atmospheric pressure. At the beginning of the molding process, by reason of the sub-atmospheric pressure in the jacket surrounding the foraminous mold, the tendency of the liquid carrying the pulp fibres is to flow outwardly through the holes of the mold walls. Consequently, the pulp fibres are retained on the walls of the mold while the liquid passes through its pores. As the molding process continues the thickness of the fibrous blanket increases while simultaneously the resistance to the flow of liquid through the fibrous wall into the jacket increases. Provision is made for flowing pulp stock out of the mold while the fresh stock from the supply tank is being introduced. Hence, the particles of pulp are energized with a velocity head which tends to maintain them in motion. As the fibrous wall being built up on the walls of the mold increases in thickness with resultant increase in resistance to the flow of liquid through the foraminous walls of the mold, there finally reaches a condition when the velocity head of the particles or pulp fibres is greater than the force tending to draw the pulp fibres to the wall of the mold. When this condition exists the excess stock, including fibres, pass out of the mold, leaving a wall of pulp fibres on the interior surface of the mold, the thickness of which may be predetermined by adjustments to be described hereinafter.

Therefore, in accordance with the invention, there is a selective deposition of pulp fibres upon the walls of the mold which permits of the production of hollow articles having smooth interior surfaces since the lumps or clots of fibres, almost invariably present in pulp stock made up for commercial use, are washed away from the walls and, if desired, may be returned to the pulp supply tank together with the excess stock mentioned in the foregoing. At the same time, there is a washing of the fibrous blanket tending to smooth out the fibres and mat them, resulting in a further smoothing out of the interior surface of the article being formed.

It will be understood that the procedure just described will require only a few seconds, after which the stream of pulp stock may be cut off or the mold removed from a continuous stream of pulp stock, when the article so formed may be given a treatment to remove carrier liquid from the built-up wall. Finally, the article may be given further treatment as desired, whereby to impart thereto certain advantageous characteristics, depending upon the use for which the article is intended.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which:

Fig. 1 is a plan view of one form of appaartus;

Fig. 2 is a view in elevation partly in section of the apparatus shown in plan in Fig. 1;

Fig. 3 is a view in cross-section of a three-way valve.

Fig. 4 is a cross-sectional view in elevation of a mold with vacuum jacket over a jet to illustrate the molding process;

Fig. 5 is a plan view in part of a modified form of apparatus;

Fig. 6 is a view in elevation of the apparatus shown in Fig. 4; and

Fig. 7 is a view on line 7—7 of Fig. 6.

Fig. 8 is a view in elevation, partly in section of a separable mold;

Fig. 9 is a view in perspective of a part of the separable mold; and

Fig. 10 is a view in cross-section of the separable mold.

In the following description and in the claims, various details will be identified by specific names for convenience, but they are intended to be as generic in their application as the art will permit. Like reference characters denote like parts in the several figures of the drawings.

Referring now to the drawings, 10 represents a pulp supply tank in which is maintained a supply of pulp stock 11 of desirable concentration. Leading from the supply tank 10 is a conduit 12 connected with the suction side of a centrifugal pump 13. Connected to the discharge side of the centrifugal pump 13 is a discharge conduit 14

passing upwardly through the tank and terminating in a threaded opening 15. A jet 16 threaded at its lower end 17 is screwed into the threaded opening 15 of the discharge conduit, which provides for vertical movement and adjustment of the jet 16. The opposite upper end 18 of the jet 16 is threaded. A disc 19, which may be circular and have a flat surface 20, is provided with a threaded opening 21 and screwed on the threads 18. This provides for vertical movement and adjustments of the plate surface 20.

Intermediate the centrifugal pump 13 and the jet 16 and positioned within the tank 10 above the surface of the pulp stock 11 there is a by-pass conduit 22 connected with the discharge conduit 14 of the centrifugal pump 13. This by-pass conduit is equipped with a by-pass valve 23.

Fixed to the tank is a bracket 24 upon which is mounted a molding device represented generally by reference character 74 carrying an actuating mechanism. The mold 25 itself is fixed within a jacket 27. The jacket 27 is provided with a threaded opening 28 screwed onto a conduit 29, which in turn is fixed to a hub 30. The hub 30 is fixed to a cylindrical axle 31, which in turn is mounted in a bearing 32. Fixed to the axle 31 is a crank 33 provided with a pin 34, which in turn is movably connected to an actuating arm 35. The opposite end of the arm 35 is connected to the end of a solenoid arm 35' which projects into a solenoid. A spring 37 mounted on the arm 35' between the solenoid and shoulder 9 tends to maintain the actuating arm 35 in the position shown in Fig. 1. When current is passed through the solenoid 36 from connecting wires 38 and 39, the actuating arm 35 is drawn toward the direction of the solenoid 36 and consequently actuates the crank 33, which in turn causes the mold 25 to revolve horizontally about the pivot provided by the axle 31. Also connected to the actuating arm 35 is a valve actuating arm 40 connected at one end by a pin 41. The opposite end of the valve actuating arm 40 is provided with a slot 42 engaging a pin 43 fixed to a valve stem actuating arm 44 fixed at 45 to the valve stem 46. A spring 8 tends to hold the valve stem actuating arm 44 in the position shown in Fig. 1.

The valve 47 has a valve plug 48 provided with a passageway 49. The valve housing is provided with three openings 51, 52 and 53. Screwed in the opening 51 is a nipple 54 to which is connected a conduit 55 which may, if desired, be flexible. The opposite end of the conduit 55 is connected likewise with an opening 56 in the conduit 29.

The opening 52 in the valve housing is likewise provided with a nipple 57 to which is connected a conduit 58 leading to a supply of air under super-atmospheric pressure (not shown). The remaining opening 53 in the valve housing is likewise provided with a nipple 59, which is connected with a conduit 60, which also, if desired, may be flexible. The conduit 60 on its opposite end is connected with a nipple 61 leading into a vacuum tank 62, provided with a gauge 63 and a suction line 64 leading to a vacuum pump 65. The vacuum tank is provided with a water drawoff 66.

The vacuum pump is operated by prime mover 66', which may be an electric motor. The vacuum pump is operated by pulley 67 on the vacuum pump and pulley 68 on the motor connected by a belt 69. The motor 66 is connected by pulley 70 and pulley 71 on the centrifugal pump and a belt 72, which serves to operate the centrifugal pump 13.

The solenoid 36 hereinbefore mentioned may be connected with a time clock arrangement indicated by 73 whereby the molding device represented generally by the reference character 74 and valve 47 may be actuated in timed relation.

The molding apparatus just described may be operated as follows: A suitable supply of pulp stock is charged into the tank 11. The term "pulp stock" in this connection has reference to a suspension of pulp fibres in water or other suitable carrying liquid as it is discharged from the beaters. Various types of pulp stock may be used and the concentration and other characteristics will be determined by the type of article to be formed and the characteristics which it is desired to impart thereto.

After the supply tank is charged with a suitable supply of pulp stock the motor 66' is placed in operation, which in turn operates the vacuum pump 65 and the centrifugal pump 13. Consequently the pulp stock is discharged upwardly through the conduit 14. If desired, the entire discharge of the centrifugal pump may be directed through the jet 16 by completely closing the by-pass valve 23. On the other hand, by regulating the opening in the by-pass valve 23 the flow of pulp through the jet may be regulated as desired. It will be apparent that the pulp stock being discharged from the jet 16 will take the form of a geyser or fountainlike column which spreads umbrellawise and flows laterally and downwardly in a stream over the interior surface of the mold. The height of the geyser may be regulated by adjustment of the by-pass valve opening.

Having adjusted the geyser at a desirable height the plate 20 may be also adjusted as to height, to adjust within limits, the rate of flow of pulp stock out of the mold. The time clock arrangement may then be set in operation. It will be understood that it is suitably connected with the solenoid 36. When the current is off the solenoid 36, the mold will take a position directly over the geyser of pulp stock. Meantime the valve plug 48 takes the position as shown in Fig. 3, in which the jacket chamber 75 is openly connected through conduit 29, 55, passageway 49, conduit 60, into the vacuum tank 62. Under these conditions, the tendency of the pulp stock is to flow through the pores of the walls of the foraminous mold 25. The walls of the mold, however, retain the pulp fibres immediately adjacent thereto and the liquid flows into the vacuum chamber 75 of the jacket 27, through the conduits just mentioned into vacuum tank 62. As the pulp is deposited upon the walls of the foraminous mold, there is a gradual increase of resistance against flow of the pulp stock toward the walls of the mold. Finally, the pulp fibrous blanket, which is thus built up upon the interior surface of the walls of the foraminous mold offers sufficient resistance to a further deposit of pulp fibres that the velocity head on the particles provided by the jet 16 is greater than the force tending to draw the fibres toward the interior surface of the walls of the foraminous mold. When this condition is reached, the excess pulp stock is flowing out of the mold through the space 76 between the bottom wall 77 of the jacket 27 and the upper surface 20 of the plate 19. It will be observed that the velocity head of the stream of pulp flowing in and out of the mold may be regulated within limits by adjusting the

by-pass valve 23 and the space 76 between the bottom 77 of the jacket 27 and the upper surface 20 of the plate 19. It will be understood that, when the proper conditions of operation are determined, these adjustments are maintained and it is not necessary to change the adjustment during the molding operation in forming a hollow pulp article. It will be understood also that the amount of vacuum may be controlled. Ordinarily, the greater the vacuum, the thicker will be the thickness of pulp wall built up, other conditions remaining constant.

As the desired quantity of pulp fibres has been deposited upon the inner surface of the walls of the foraminous mold 25, there is meantime a selective deposition of pulp fibres upon the fibrous blanket being formed and clots and lumps of pulp fibres which may be present in the pulp stock are washed away and returned to tank 11. Consequently, there is a resultant smoothing out of the interior surface of the pulp wall which has been thus built up.

Next, electric current is permitted to flow through the solenoid 36, through the connecting wires 38 and 39 from a suitable source of power (not shown). The interval of flowing current may be controlled by the time clock arrangement. This causes actuation of the arm 35 toward the solenoid, which in turn operates the crank 33 and revolves the molding device 74 in a horizontal plane about the axis of the axle 31. Consequently, the mold itself is moved away from the geyser 78. Meantime, the conduits 29, 55, passageway 49, and conduit 60 remain open for a short period, which is determined by the length of the slot 42 in the arm 40. During this time, water in the pulp blanket which has been formed is further extracted and the liquid is drawn into the vacuum tank 62. Finally, the arm 40 actuates valve stem arm 44, which in turn revolves the valve stem 46 and valve plug 48, in such manner that passageway 49 takes the position shown in dot-dash lines at 50, thus connecting with conduits 58 and 55. Since conduit 58 is connected with a supply of air under superatmospheric pressure, pressure is built up in the jacket chamber 75 and loosens the container which has been previously formed on the walls of the mold. The container may then be discharged from the mold and the current is cut off from the solenoid. By reason of the spring 37, the molding device is again actuated in the opposite direction, returning the mold to its original position over the geyser, and the cycle may be repeated. A stop pin 79 fixed to the hub 30 registers with a groove 80 in the crank 33 to limit the movement of the molding device represented generally by the reference character 74.

While automatic mechanism has been disclosed whereby the molding device may be actuated, it will be apparent that in some instances automatic mechanism is unnecessary and the mold may be moved in and out of contact with the pulp geyser manually and the valve operating the vacuum and pressure may also be operated by hand.

The modified form of apparatus illustrated in Figs. 5, 6 and 7 is similar to that disclosed in Figs. 1 and 2, except that the molding device mechanism is designed to operate the mold vertically over the geyser, rather than in a horizontal plane as described hereinbefore.

The molding device represented generally by the reference character 100 comprises a bracket 99 upon which is mounted two posts 101 and 102. The twin sleeve 103 is designed to operate vertically upon the posts 101 and 102. This sleeve takes the form of a cross-head. The mold is fixed in a jacket, as previously described, and the jacket is connected to a conduit 129 and a flexible conduit 155, which in turn is connected with valve 147. This valve 147 is similar to the valve 47 previously described. The cross-head 103 is connected with a cross-head actuating arm 104, which is provided at its upper end with a cam roller 105. A cam pulley 106 is mounted in a shaft 107, which in turn is mounted in a bearing 108, fixed to the standard 109 supporting the valve 147. Connected to the shaft 107 is a drive pulley 110 connected by a belt 111, which in turn is connected with a prime mover (not shown). The cam roller 105 operates in a cam groove 112. Also mounted on a standard 109 is a valve actuating lever 113 movably mounted on a pivot pin 114 fixed to a shoulder 115, which in turn is fixed to a standard 109. The valve actuating lever is provided with a slot 116, which in turn is connected with a pin 117 fixed to a valve stem actuating arm 118 connected at its opposite end to valve stem 119. The valve actuating lever 113 is provided with a cam roller 120, which operates on a cam track 121 on the cam pulley 106.

With reference to the movement of the pulp stream the operation of this molding apparatus is similar to that previously described. The mold, however, moves vertically in and out of contact with the pulp stock geyser. The pulley 110 is placed in operation, which in turn revolves the cam pulley 106 about the axis of the shaft 107. When the cams are in the position as shown in Fig. 7 the mold is in its lowermost position and the depositing of pulp on the walls of the mold is taking place. As the cam pulley revolves and the cam roller 105 reaches the position 121 the the mold is raised vertically away from the pulp geyser. Cam roller 120 in the meantime allows the suction to continue for a short period after the mold is moved away from the pulp stock geyser and when it reaches a point 122 on the cam track 121 valve 147 is actuated. This further draws water from the fibrous wall built up in the mold. The vacuum is cut off and there may be a slight dwell. When the point 123 of the cam track 121 reaches the cam roller 120 the valve 147 is actuated in such manner that the air pressure flow through the valve 147 into the jacket chamber surrounding the mold and the article which has been formed is loosened and discharged from the mold. As the cam pulley continues in its movement the empty mold is returned to the geyser and the cycle may be repeated.

It will be understood that hollow articles with restricted openings may be made by suitable design of the foraminous mold. Such a mold may take the form shown in Figs. 8, 9 and 10. The mold may comprise separable parts, mounted in a cylindrical jacket 227. Supporting the side walls of the mold are a series of ribs 203. As shown there are two lateral elements 200 and 201 forming halves of the side wall of the mold. Cooperating with these members is a foraminous bottom piece 202 and top piece 203. The top piece 203 is fixed to the jacket bottom 204 and is provided with an opening 205 into the mold cavity 206. The bottom piece abuts projections 207 extending from the ribs 203. The ribs may be reinforced by semi-circular rings 208 and 209, so that the structure within the jacket comprises two principal members each including half of the

mold itself. The bottom member 202 may, if desired, be secured to one of these members or may be a separate part. These members forming the mold may be easily assembled and slipped into the jacket 227. A separable closure member 210 may be inserted over the end of the jacket 227 and made air tight by means of bolts and wing nuts 211. A gasket 212 may be inserted between the jacket walls and the closure. The jacket is connected with a conduit 229 which corresponds with conduit 29 previously referred to.

It will be seen from the foregoing description that the invention provides a process which is rapid in its operation. Articles may be formed in a cycle not requiring more than 5 to 10 seconds and in some instances less, yet by reason of the selective deposition of fibres from the pulp stream, there results a very desirable smooth interior surface on the containers thus produced. Furthermore, the machine and process of the invention are admirably suited to produce articles having walls of various thicknesses.

If desired, the articles may be treated with suitable coatings or fillers to render them oil and water proof. In some instances the coatings may be applied to the articles while still comparatively wet in the mold, and prior to ultimate removal of the carrier liquid from the walls of the article.

While certain novel features of the invention have been disclosed and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. Apparatus for molding articles of fibrous material comprising a liquid stock tank for said fibrous material, a hollow foraminous mold having a downwardly directed mouth for receiving said fibrous material, a jacket surrounding said mold, an upwardly pointing jet beneath said mold adapted to project the liquid stock upwardly in the form of a geyser, means for moving liquid stock from said tank in a stream of controlled velocity head through said jet into the interior of said mold, and means for controlling the amount of fibers deposited on the walls of said mold including mechanism for maintaining a sub-atmospheric pressure in said jacket and a baffle adjacent the mouth of said mold to regulate the flow of fibrous stock out of said mold under controlled velocity head.

2. Apparatus for molding hollow pulp articles which comprises a supply tank for pulp stock, a hollow foraminous mold shaped to define a mold cavity and having a downwardly disposed restricted pulp charging opening, a jacket about said mold, means for maintaining a vacuum within said jacket, means including a pulp stock pump for moving said pulp stock from said supply tank, a vertically disposed jet on the discharge side of said pump to project a column of pulp stock upwardly through said restricted opening into the interior of said mold in the form of a geyser spreading umbrellawise, and means including a by-pass on the discharge side of said pump for controlling the velocity head of said pulp stock in and out of the restricted opening of said mold while pulp fibres are being deposited on the walls of said mold from said geyser.

3. Apparatus for molding hollow pulp articles which comprises a supply tank for pulp stock, a foraminous mold above said tank, a jacket surrounding said mold, a vacuum tank, a conduit connecting said vacuum tank to said jacket for maintaining a sub-atmospheric pressure within said jacket, means including a conduit for moving said pulp stock from said supply tank, a jet having a vertically adjustable baffle thereon on the end of said second mentioned conduit to discharge pulp stock therefrom in the form of a controlled fountain-like column flowing toward and away from said mold, and means for moving said mold in and out of contact with pulp stock discharged from said jet.

4. Apparatus for molding hollow pulp articles comprising a supply tank for pulp stock, a hollow foraminous mold, a jacket about said mold, means for maintaining a sub-atmospheric pressure within said jacket, a conduit leading from said supply tank, means for moving said pulp stock from said supply tank through said conduit, a discharge opening in said conduit adapted to discharge pulp stock from said conduit in a geyser-like column, means for controlling the height of said column to cause it to break and spread said pulp stock laterally and downwardly in a continuous flowing stream over the interior surface of said mold, means for moving said mold in and out of contact with said geyser-like column of pulp stock and means including a plate adjacent said mold and said discharge opening for partial adjustment of the velocity head of pulp stock flowing out of said mold after a blanket of pulp has been deposited on said interior surface from said flowing stream.

5. Apparatus for molding hollow articles from pulp stock which comprises, a supply tank for said stock, an upwardly disposed stationary jet communicating with said tank and through which a stream of pulp stock from said tank may be caused to flow upwardly and to spread laterally and flow downwardly in a reverse direction, a foraminous hollow mold having a downwardly directed opening adapted to be placed over the upwardly flowing stream, a vacuum pump, a vacuum jacket disposed about said mold, a pivotally mounted hollow arm supporting said jacket and forming a conduit between said jacket and said vacuum pump, means to move said arm about its pivot to move said opening over said upwardly flowing stream, and means for adjusting the flow of said stock in and the discharge out of said opening while fibres are being deposited from said stream upon the interior surface of the walls of said mold.

6. In a process of molding hollow containers from pulp stock the steps which include feeding a stream of pulp stock of restricted cross-section upwardly into a hollow foraminous mold, causing said stream to break and spread laterally and downwardly in a direction reverse of said upwardly flowing stream and over the entire interior surface of said mold while maintaining a partial vacuum on the outside of the porous walls of said mold whereby to deposit pulp fibres from said laterally and downwardly flowing stream upon said interior surface of the mold and to draw liquid from said stream through the pores of said walls, and maintaining the flow of pulp stock in and out of said mold while depositing pulp fibres on said walls from said stock, whereby to selectively deposit the pulp fibres on said mold walls.

7. In a process of molding hollow containers from pulp stock the steps which include projecting a stream of pulp stock upwardly into a hollow foraminous mold through the mouth thereof while maintaining a vacuum on the outside of the porous walls of said mold, causing said stream to break and flow laterally and flow downwardly

along the interior surface of said mold in a continuous sheet whereby to cause pulp fibres from said stock to be deposited from said flowing sheet of pulp stock on the interior surface of said mold and to draw liquid from said stock through the pores of said walls, maintaining a stream of pulp stock flowing into the interior of said hollow mold and causing a predetermined amount of said stock entering said mold to flow over the deposited fibres and out of said mold through said mouth while pulp fibres are being deposited on said walls from said stock and meanwhile controlling the velocity head of the flowing pulp stock whereby to deposit a layer of fibres of desired thickness.

8. In a process of forming hollow articles from pulp stock the steps which comprise maintaining a supply of said stock containing a predetermined quantity of pulp fibres in water, causing a column of pulp stock drawn from said supply to flow upwardly in a column of restricted cross-section, causing said column to flow through an opening into a hollow foraminous mold and to flow laterally and downwardly along the interior surface of said mold, maintaining a partial vacuum on the exterior of said mold whereby to deposit fibres from said flowing stock on the interior surface of said mold and causing a part of the flowing stock to pass out of said mold in a controlled stream through said opening while simultaneously depositing fibres on said surface from said flowing stock.

9. In a process of forming hollow articles from pulp stock the steps which comprises maintaining a supply of said stock containing a predetermined quantity of pulp fibres in water, maintaining a fountain-like column of pulp stock drawn from said supply, causing said fountain-like column to flow through an opening into a foraminous mold and to spread umbrellawise laterally and downwardly over the interior surface of the mold, maintaining a differential pressure between the exterior and interior of said mold whereby to deposit fibres from said moving stock on the interior surface of said mold and causing a part of the stock of said laterally and downwardly moving stock to pass out of said mold in a controlled stream through said opening while simultaneously depositing fibres on said surface from said laterally and downwardly moving stock.

10. In a process of forming hollow articles from pulp stock, the steps which comprise maintaining a supply of said stock containing a predetermined quantity of pulp fibres in water, maintaining a geyser of pulp stock drawn from said supply, causing said geyser to flow through an opening into a hollow foraminous mold and then laterally and downwardly in a stream over the interior walls of said mold, maintaining a vacuum on the exterior of said mold whereby to deposit fibres from said laterally and downwardly moving stream on the interior surface of said mold, causing a part of the stock introduced into the mold to pass out of said mold through said opening while simultaneously depositing fibres on said surface from said moving stream, and adjusting the velocity head of said stock by controlling the rate of flow of said stock both in and out of said mold.

11. In a process of forming hollow articles from pulp stock the steps which comprise maintaining a supply of said stock containing a predetermined quantity of pulp fibres in water, maintaining a geyser of pulp stock drawn from said supply, causing said geyser to flow upwardly through an opening into a hollow foraminous mold and then laterally and downwardly, maintaining a vacuum on the exterior of said mold whereby to deposit fibres from said flowing stock on the interior surface of said mold, causing a part of the stock of said geyser to pass downwardly out of said mold through said opening while simultaneously depositing fibres on said surface from said geyser and controlling the amount of pulp fibres deposited upon the interior surface of said mold by adjusting the said vacuum and the velocity head of said moving pulp stock.

12. A process of forming hollow articles of pulp which comprises maintaining a supply of pulp stock of predetermined concentration, introducing a restricted stream of pulp stock from said supply upwardly into a hollow foraminous mold, causing said upwardly flowing restricted stream to break and flow laterally and downwardly umbrellawise, maintaining a predetermined sub-atmospheric pressure on the outside of said mold whereby to deposit pulp fibres from said laterally and downwardly flowing stream onto the interior surface of said mold, causing a part of said downwardly flowing stream to flow out of said mold and controlling the velocity of the stream moving through said mold to cause a selective deposition of pulp fibres on the interior of the hollow article being formed whereby to produce a smooth interior surface on said article.

13. Apparatus for molding pulp including a hollow foraminous mold having a downwardly directed restricted opening, means for flowing a column of pulp upwardly through said mold, and means for controlling the flow of pulp out of said mold including a baffle engirdling said column adjacent the restricted opening of said mold.

14. Apparatus for molding pulp including a pulp supply, a discharge conduit in the form of an upwardly disposed jet connected thereto, means for flowing pulp from said supply and through said conduit, a hollow foraminous mold having a downwardly disposed mouth, means mounting said mold for registry with said discharge conduit and a baffle surrounding said discharge conduit in juxtaposition with said mouth, and means mounting said baffle and mold for relative adjustment to control the rate of flow of pulp stock over the interior surface of the mold.

15. Apparatus for molding hollow articles from pulp stock which comprises, a supply tank for said stock, an upwardly disposed stationary jet, a conduit connecting said jet and tank, a centrifugal pump intermediate said jet and tank to force a column of pulp stock upwardly through said jet, means including a by-pass to return a predetermined part of said stock discharged from said pump to said tank and to adjust the height at which the column of pulp stock discharged through said jet breaks and flows laterally and downwardly umbrellawise, a hollow foraminous mold having a downwardly directed charging opening supported on a pivotally mounted arm and means adapted to adjust said jet relative to said mold whereby to cause a deposition of pulp fibres of uniform thickness from said laterally and downwardly flowing stock when a suction is applied to the exterior of said mold.

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