Dec. 29, 1931. M. P. CHAPLIN 1,838,904

PULP MOLDING MACHINE

Filed March 14, 1928

Fig. 1.

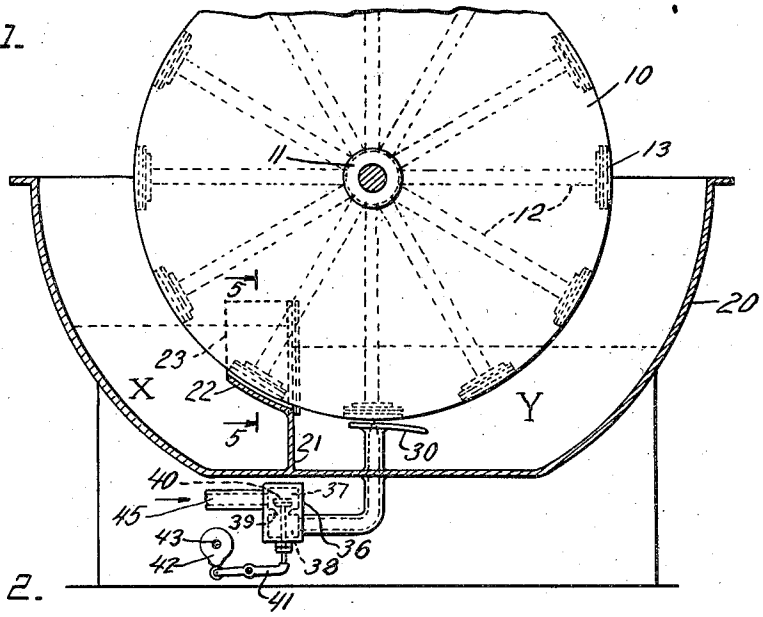


Fig. 2.

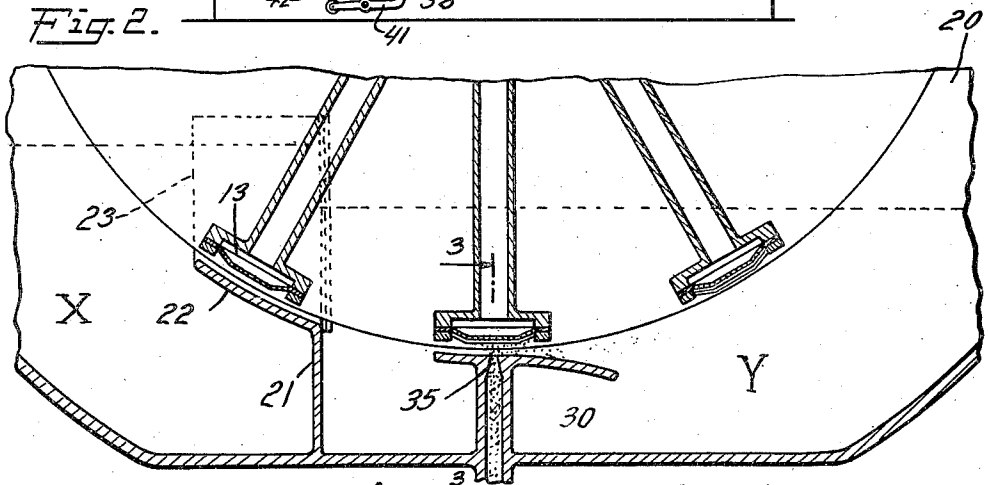


Fig. 3.

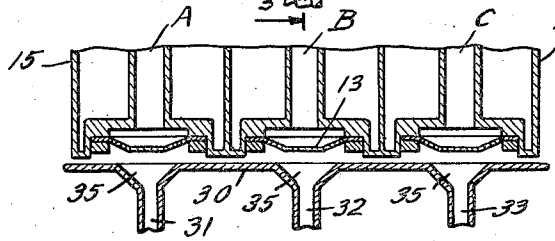


Fig. 4.

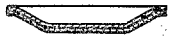
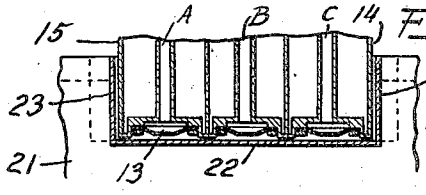


Fig. 5.



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UNITED STATES PATENT OFFICE

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PULP MOLDING MACHINE

Application filed March 14, 1928. Serial No. 261,438.

This invention relates to pulp molding machines.

More particularly stated the invention relates to the manufacture of multi-layer articles in pulp molding machines.

In the forming or manufacture of multi-layer articles it is sometimes desirable, in order to secure a compact and impervious surface, to utilize a suitable material to fill in the spaces between the pulp fibers as the pulp is deposited on the forming die. Such material must of necessity be finely divided and the individual particles must be small enough to permeate the pulp deposit and lodge between the pulp fibers.

It is customary to mix such filling material with the pulp solution and the passage of the water through the material, due to the suction on the forming die, causes a certain amount of the filling material to be retained in the formed article and lodge between the fibers thereof. However, a considerable amount of the filling material is carried completely through the formed article by the suction and is washed away in the water that is sucked through the forming die during the forming of the layer of pulp on the die. This is particularly true when the filling material is mixed with the pulp solution used to form a layer on the wire screen or die face and another layer of pulp is then deposited on the first layer. Under such circumstances the water from the solution last deposited in passing through the first layer of pulp carries with it a considerable part of the filling material.

With the above difficulties in mind this invention has for one of its objects to provide a compact impervious molded pulp article.

Another object of the invention is to be provide an improved method of permeating a molded pulp article with finely divided material.

Another object of the invention is to provide a method and means whereby filling or other like material can be positioned or located in the inside or unexposed portion of the molded article.

Further objects of the invention will appear from the following specification taken in connection with the drawings, which form a part of this application, and in which

Fig. 1 is an elevational view somewhat diagrammatic of a machine constructed in accordance with the invention and adapted to carry out the method;

Fig. 2 is an enlarged sectional elevation showing a plurality of dies and a portion of the vat;

Fig. 3 is a sectional elevation taken substantially on line 3—3 of Fig. 2;

Fig. 4 is a sectional elevation showing an article made on the machine constructed in accordance with the invention and by the method hereinafter described and

Fig. 5 is a sectional elevation taken substantially on line 5—5 of Fig. 1.

The invention briefly described consists of a method of and a machine for forming an article having a deposit of filling material disposed within the article between the front and back surfaces thereof. In the form of the invention illustrated the method consists of forming a layer of pulp deposit on and permeating the layer with finely divided filling material and then forming a further layer of pulp on the back of the filling material. By forming the article in this manner the filling material is not sucked through the screen or die face with the water and, furthermore, is not exposed since there is a layer of pulp on both sides thereof.

In the particular form of apparatus or machine illustrated for carrying out the method, a vat is provided with compartments having different solutions therein and means is provided at a predetermined position in the vat for so injecting the filling material that it will be deposited on the layer of pulp already deposited on the die. The dies are mounted on a carrier and are movable successively through the different pulp solutions and in the first compartment receive a layer of one character of pulp, then move to the second compartment to receive another layer and also the filling material, and after receiving the filling material the dies receive a further layer of pulp.

Further details of the invention will appear from the following description.

In the form of the invention illustrated in the drawings there is shown a carrier 10 having a hub 11, conduits 12 extending radially from the hub, and forming dies 13 of any suitable construction mounted on the outer ends of the conduits.

As shown in Fig. 3, the conduits and dies are arranged side by side in sets of three, shown at A, B and C, and the carrier is provided with side walls or faces 14 and 15 outside the conduits and dies A and C. The die faces of the dies 13 are perforated and through the hub 11 the arms 12 are connected to a suitable source of suction so that as the dies pass through the vat pulp is deposited thereon from the pulp solutions.

The carrier and dies are mounted above a vat 20 having a partition 21 forming two compartments, X and Y. As shown in Fig. 2, the partition 21 has extending laterally therefrom into the compartment X, a ledge or shelf 22 preferably slightly curved or arcuate to conform to the arcuate path of movement of the dies. If desired, the partition may also have formed thereon and disposed above the shelf, side walls 23 which with the shelf 22 form a trough through which the dies pass, the partition being provided with an opening above the shelf to permit the passage of the carrier and dies.

As the dies pass through the solution in the compartment X, a layer of pulp is deposited thereon, and since the trough formed by the walls 23 and the shelf 22 enclose a comparatively limited amount of pulp solution substantially all of the pulp solution in the trough is deposited on the dies, thus preventing its being carried with the dies and carrier into the compartment Y.

If desired, the compartment X may have one character of solution therein, such for instance as a high grade or light colored pulp, and the compartment Y may have a coarser or darker grade of pulp.

There is positioned at a predetermined point in the compartment Y a shelf or ledge 30 having connected thereto conduits 31, 32 and 33 spaced a distance apart corresponding to the conduits A, B and C. The upper ends of the conduits are tapered, as shown in Fig. 2, at 35 to form nozzles.

Each conduit communicates with a valve casing 36 having a pair of chambers 37 and 38 therein which are adapted to communicate with each other through a port 39. The communication through the port 39 is controlled by a valve 40 which in turn is controlled by a tappet lever or rod 41. The levers 41 are controlled by cams 42 mounted on a cam shaft 43. Each chamber 37 has connected thereto a conduit 45 which in turn is connected to a supply of suitable filling material and this material is preferably pumped under pressure into the conduits 45.

The cam shaft 43 is rotated at such a speed that the valves 40 will be opened at the periods in the cycle of revolution of the carrier 10 when a set of dies is positioned above the nozzles 35. It is obvious that the shelf, conduits and nozzles can be located at any desired point in the compartment Y or, if desired, in another compartment, so that the filling material will be deposited on the die and layer of pulp thereon at any desired period in the cycle of operation.

The machine operates in the following manner. As the dies pass through the compartment X a layer of pulp from the solution therein is deposited on the dies. When the dies pass over the shelf 22 into compartment Y an intermixture of the pulp from the compartments X and Y will be deposited thereon and then a small amount of pulp from the compartment Y will be deposited. When the dies reach a position over the nozzles 35 the valves 40 will be opened and a mixture of filling material will be deposited on the layer of pulp already formed on the dies. Then, as the dies continue to move through the compartment X, an outer layer of pulp for compartment X will be deposited on and cover the layer of filling material.

It is obvious that the amount of suction and the location of the partition 21 can be so determined that sufficient layer of pulp will be deposited on the dies prior to the depositing thereon of the filling material to prevent the filling material being sucked through the layer of pulp and through the die face with the water which is removed from the deposit by the suction.

It will be evident from the method and apparatus above described that articles formed thereby will have inner and outer layers of pulp and a deposit of filling material positioned between and concealed by the inner and outer layers.

Although one specific embodiment of the invention has been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A pulp molding machine comprising a carrier, a die mounted thereon, a pulp vat having a plurality of compartments, said die being movable successively by the carrier through said compartments, and means in one of said compartments for depositing finely divided filling material on said die and the pulp deposited thereon when the die reaches a predetermined position.

2. A pulp molding machine comprising a carrier, a die mounted thereon, a pulp vat

having a plurality of compartments, said die being movable successively by the carrier through said compartments, and means in advance of one of said compartments for depositing finely divided filling material on said die and the pulp deposited thereon when the die reaches a predetermined position.

3. A pulp molding machine comprising a carrier, a die mounted thereon, a pulp vat having a plurality of compartments, said die being movable successively by the carrier through said compartments, and means including a nozzle in one of said compartments for depositing finely divided filling material on said die and the pulp deposited thereon when the die reaches a predetermined position.

4. A pulp molding machine comprising a carrier, a die mounted thereon, a pulp vat having a plurality of compartments, said die being movable successively by the carrier through said compartments, and means including a nozzle in advance of one of said compartments for depositing finely divided filling material on said die and the pulp deposited thereon when the die reaches a predetermined position.

5. A pulp molding machine comprising a carrier, a die mounted thereon, a pulp vat having a plurality of compartments, said die being movable successively by the carrier through said compartments, a ledge in one of said compartments disposed below and adjacent to the path of travel of said die, and means for injecting through said ledge finely divided filling material when the die reaches a position opposite said ledge.

6. A pulp molding machine comprising a carrier, a plurality of sets of dies radially mounted on said carrier, the dies of each set being disposed side by side in alinement with each other, a tank having a ledge therein disposed below the path of travel of said dies, and means for injecting through said shelf jets of filling material.

7. A pulp molding machine comprising a carrier, a plurality of sets of dies radially mounted on said carrier, the dies of each set being disposed side by side in alinement with each other, a tank having a ledge therein disposed below the path of travel of said dies, and means including nozzles disposed below the path of movement of the dies for injecting through said shelf jets of filling material.

8. A pulp molding machine comprising a carrier, forming dies mounted thereon, a nozzle disposed below the path of travel of said dies, and means synchronized with the movement of said dies over said nozzle for directing a jet of filling material through said nozzle.

9. A pulp molding machine comprising a carrier, forming dies mounted thereon, a nozzle disposed below the path of travel of said dies, and valve means synchronized with the rate of movement of the dies over said nozzle for controlling the passage of filling material through said nozzle.

10. A pulp molding machine comprising a carrier, a plurality of dies mounted thereon, a vat disposed below said carrier and adapted to receive said dies, a plurality of compartments in said vat for holding different pulp solutions, and means in one of said compartments for injecting filling material below the path of movement of said dies.

11. A pulp molding machine comprising a carrier, a plurality of dies mounted thereon, a vat disposed below said carrier and adapted to receive said dies, a plurality of compartments in said vat for holding different pulp solutions, and valve controlled means in one of said compartments for injecting filling material below the path of movement of said dies.

12. A continuous method of forming molded articles which consists of forming a layer of pulp of fibers of selected size, projecting more finely divided fibrous material on said layer and covering said deposit of more finely divided material with another layer of fibrous pulp.

13. A continuous method of forming molded articles which consists of successively passing forming dies through a plurality of pulp solutions containing fibers of selected size, thereby to form deposits of pulp on the dies, projecting on and permeating one of said pulp deposits on the die, with a filling of more finely divided fibrous material, and covering said filling of more finely divided material with a deposit from another of said pulp solutions.

14. A continuous method of forming molded articles which consists of forming a layer of pulp of fibers of selected size, on a forming die, by the application of suction to the pulp, projecting a more finely divided fibrous material on said layer, by the application of pressure to said divided material, independently of said application of suction, and covering the deposit of more finely divided material with another layer of fibrous pulp by the application of suction to the latter pulp.

In witness whereof, I have hereunto set my hand this 5th day of March, 1928.

MERLE P. CHAPLIN.