

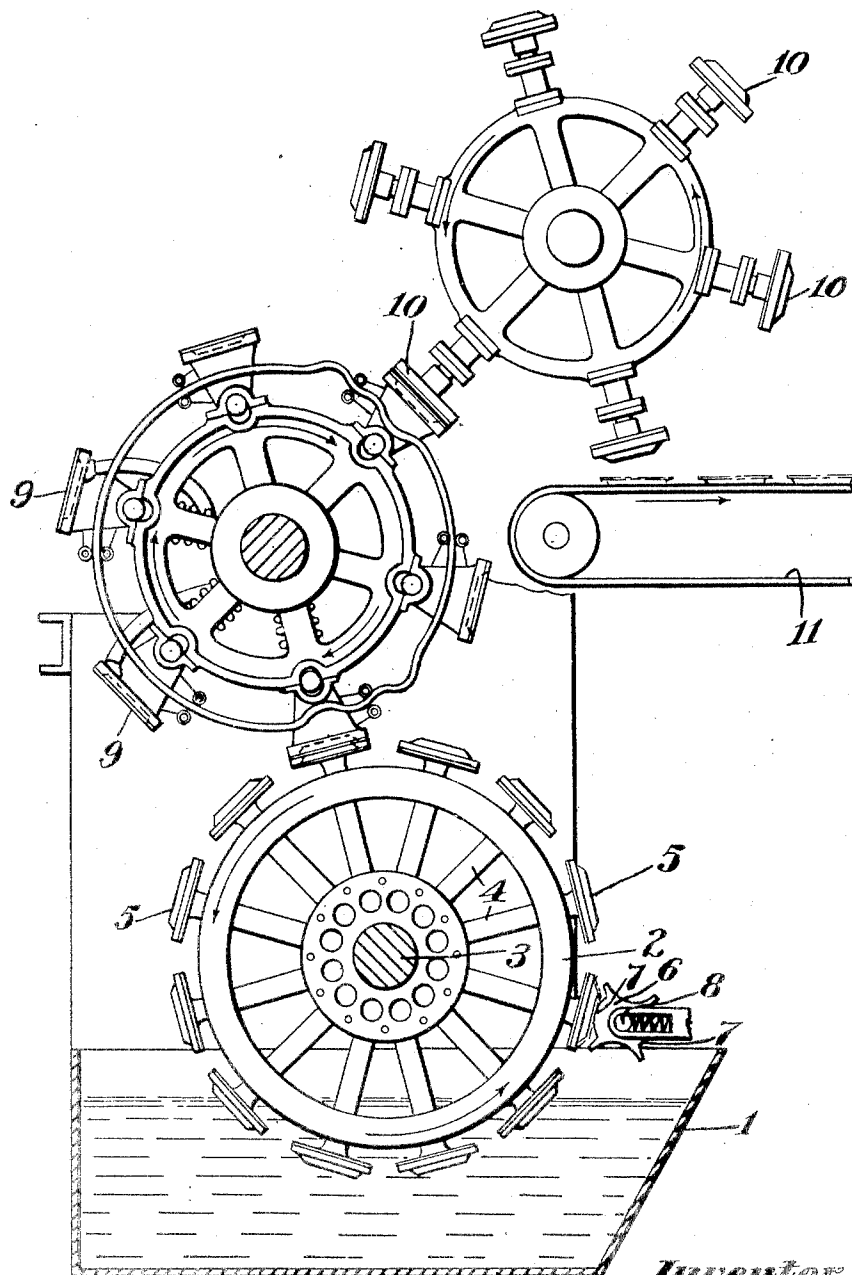
Feb. 16, 1932.

M. P. CHAPLIN

1,845,831

ART OF PRODUCING MOLDED PULP ARTICLES

Filed Nov. 2, 1928



Inventor
Merle P. Chaplin

W. S. Spear Jr.
By Attorney

UNITED STATES PATENT OFFICE

MERLE P. CHAPLIN, OF WATERTVILLE, MAINE, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO FIDELITY TRUST COMPANY, TRUSTEE, OF PORTLAND, MAINE, A CORPORATION
OF MAINE

ART OF PRODUCING MOLDED PULP ARTICLES

Application filed November 2, 1928. Serial No. 316,644.

In the production of molded pulp articles by die molding methods, it is sometimes desirable to obtain greater compacting pressure than practicable over a complete die surface to produce articles of the desired formation, and in general my present invention involves a method of and apparatus for obtaining a relatively higher unit pressure on the article on the forming die than has heretofore been possible under existing methods and with existing equipment.

To this end I mount adjacent the path of movement of the forming and collecting die a rolling unit of such design and shape as to roll or press the entire surface of the article on the forming die progressively from one edge to the other edge during the travel of the forming and collecting die therepast. Such unit may conveniently be in the form of a die of suitable shape presenting a curved section which on contact with the article on the forming and collecting die presses it progressively across its entire surface.

The rolling unit rotates in properly timed relation to the travel of the forming or collecting dies and successively presents its curved section to each article on said dies as they move therepast. The action is analogous to a rolling action between two rotating surfaces with the pressure applied continuously across the article from one edge to the other. This smooths the surface of the article, pressing out the entrained water and compacting the fibres under a higher unit pressure than is possible where the article is merely pressed between matching dies.

For the purpose of this application, I shall show and describe my present invention in its adaptation to a pulp molding machine of the type wherein during the initial phase of its revolution a rotary die carrier having a peripheral series of radially disposed forming and collecting dies is passed through a vat containing the pulp solution and by vacuum draws the liquid pulp onto the faces of said dies. During a subsequent phase of rotation of the forming dies, the pulp thus collected thereon is subjected to a compressing action by means of a plurality of radially disposed pressing dies revolving in orbitally inter-

secting relation to the forming dies, eventually being transferred from the forming dies to the pressing dies, and finally from the pressing dies to a series of transfer dies, revolving in orbitally intersecting relation to the pressing dies from whence they discharge onto a conveyor which passes through a drying tunnel within which the formed articles are dried.

It will be understood, however, that this treatment is purely illustrative and in no way limiting and that other methods and machines for die molding the articles may be employed. For example, the pulp may be deposited by pressure spray jet onto the forming dies, and both forming and drying may be accomplished on these dies without pressing the articles between pressing dies or transferring the articles to transfer dies, or regardless of the method of pulp deposition on the forming dies, drying thereof may be accomplished on the pressing dies and/or on the transfer dies, or both, by the application of drying heat to one or the other or both of these series of dies.

The single figure of the accompanying drawing is an end elevation, partly in section, of a machine of the type hereinbefore referred to equipped with a pressing or rolling unit in accordance with my present invention.

In the illustrative machine shown, the pulp tank or vat is indicated at 1 and the forming die carrier which moves through said tank at 2.

As here shown, the die carrier is a rotary carrier adapted to be revolved from any suitable driving source about the horizontal axis 3 and provided with a radial series of hollow die carrying arms 4 which terminate at the periphery of the carrier in perforated forming and collecting dies 5 of the desired shape and size. The pulp is drawn onto the faces of the dies by suction as they rotate through the tank, but obviously may be deposited by other methods, as by spraying it on under pressure.

Where the suction method of pulp deposition is employed the forming and collecting die carrier is provided with mechanism

whereby a vacuum is created through the collecting dies during an initial phase of their revolution together with automatic means for shutting off the vacuum and sending compressed air through the dies during a subsequent phase of their revolution. Such mechanism forms no part of my present invention and is therefore not detailed herein.

In order to obtain an adequate unit pressure on the articles as the dies emerge from the tank or vat, I provide adjacent to the path of the die carrier a rolling unit indicated generally at 6 which unit is so designed and located as to press or roll the entire surface of each article progressively from one edge to the other as the forming dies rotate therepast.

To this end, the rolling unit structurally may take the form of a die presenting one or more curved spaced sections 7 adapted successively to contact with the articles on the forming and collecting dies with a rolling action which is effective to smooth the surface of each article as well as to press out any entrained water as the dies are rotated therepast. Two such sections 7 are shown equally spaced on 6. Such curved section 7 may be of metal or other incompressible material to smooth out irregularities or of rubber or any other material capable of a slight yielding relative to the rigid unyielding face of the forming and collecting die.

The rolling unit is mounted on a shaft 8 which is disposed parallel to the axis of rotation of the forming die shaft and is preferably driven therefrom in properly timed relation by any suitable driving mechanism.

The rolling unit is preferably mounted to contact the articles on the forming and collecting dies as soon as they emerge from the tank, or shortly thereafter if vacuum and gravity drainage is desired. Such unit may, however, be mounted in other relations so long as it is disposed so as to contact the article before it reaches the usual pressing dies 9 of the machine.

Where more than one series of pressing dies is used or where the pressing dies are heated dies for drying the articles thereon, the rolling unit avoids the necessity for applying any great pressure between the forming and pressing dies in order to compact the pulp on the forming die prior to its transfer therefrom to the pressing die.

As is usual in the type of machine shown herein, the articles are transferred from the pressing dies 9 to a series of transfer dies 10 on which they are further dried and from said dies 10 are discharged onto a conveyor 11.

Where the forming, pressing, or transfer dies, or any of them, are heated for the purpose of drying the articles thereon, the conveyor 11 may be arranged to receive the dried articles as they discharge from the particular

dies on which they have been dried and carry them to the point where they are to be stacked, counted, and packaged. Where drying on the dies is not contemplated, the conveyor 11 is passed through a drying tunnel of usual type within which drying is accomplished.

Various other modifications in method and apparatus may all be resorted to within the spirit and scope of my invention as defined by the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In pulp molding apparatus, an open face movable forming die, and a rolling unit cooperative therewith to press the entire exterior surface of the article on the forming die progressively across the open face of the die from one edge to the other as the forming die is moved relative thereto.

2. In pulp molding apparatus, an open face movable forming die, and a rolling unit cooperative therewith to press the entire exterior surface of the article on the forming die progressively across the open face of the die from one edge to the other as the forming die is moved relative thereto, said rolling unit including a surface of curved section.

3. In pulp molding apparatus, a rotary forming die, and a progressively contacting unit cooperative therewith to press the entire surface of the article on the forming die progressively from one edge to the other as the forming die is moved relative thereto.

4. In pulp molding apparatus, a rotary die carrier presenting a plurality of forming and collecting dies, and a rotary rolling unit rotating in timed relation to said forming and collecting dies and disposed successively to press the entire surface of each article on each forming die progressively from one edge to the other as the forming dies are rotated therepast.

5. In pulp molding apparatus, a rotary die carrier presenting a plurality of forming and collecting dies, and a rotary rolling unit rotating in timed relation to said forming and collecting dies and disposed successively to press the entire surface of each article on each forming die progressively from one edge to the other as the forming dies are rotated therepast, said rolling unit including a surface of curved section.

6. The method of molding pulp articles which consists in moving a forming and collecting die relative to a supply of pulp solution and in pressing the pulp deposited on the said die by a progressive rolling action transversely across the face of the article from one edge to the other as the die moves away from the pulp depositing source.

7. The method of molding pulp articles consists in rotating a forming and collecting die relative to a supply of pulp solution, and in pressing the pulp deposited on the said die by a progressive rolling action transverse-

ly across the face of the article from one edge to the other as the die rotates past said rolling unit.

8. The method of molding pulp articles which consists in rotating a die carrier having a plurality of forming and collecting dies past a pulp deposition supply, and in rotating in properly timed relation to the rotation of said die carrier a rolling unit disposed yielding to contact the articles on the forming and collecting dies as said dies are successively rotated therepast and progressively to press the entire surface of the article from one edge to the other against the die.

9. In pulp molding apparatus, an open face movable forming die, and a cooperative pressing member disposed in contacting relation to the exterior face of the article on said forming die as the forming die is moved therepast.

10. In pulp molding apparatus, an open face movable forming die, and a cooperative pressing member disposed in successively contacting relation to the exterior face of the article on said forming die as the forming die is moved therepast.

11. In pulp molding apparatus, an open face movable forming die, and a cooperative pressing member disposed in successively contacting relation thereto, in a progressive traverse of the entire exterior face of the article on said forming die surface as the forming die is moved therepast.

12. In pulp moulding apparatus, a movable forming die of open type adapted to receive an aqueous pulp deposit, and a rolling unit disposed in the path of said forming die for progressive traversing contact across the entire exterior surface of the article exposed on said forming die as said die is moved therepast whereby to smooth the surface of the article and to press out the entrained water in the article.

13. In pulp moulding apparatus, a continuously revoluble forming die of open type adapted to receive an aqueous pulp deposit, and a rolling unit disposed in the orbital path of said forming die for progressive traversing contact across the entire surface of the article exposed on said forming die as said die is rotated therepast whereby to smooth the surface of the article and to press out the entrained water in the article.

14. In pulp moulding apparatus, a movable forming die of open type adapted to receive an aqueous pulp deposit, and a continuously revoluble rolling unit disposed in the path of said forming die for progressive traversing contact across the entire exterior surface of the article exposed on said forming die as said die is rotated therepast whereby to smooth the surface of the article and to press out the entrained water in the article.

15. In pulp moulding apparatus, a continuously revoluble forming die of open type

adapted to receive an aqueous pulp deposit, and a continuously revoluble rolling unit disposed in the orbital path of said forming die for progressive traversing contact across the entire exterior surface of the article exposed on said forming die as said die is rotated therepast whereby to smooth the surface of the article and to press out the entrained water in the article.

16. In pulp moulding apparatus, a rotatable forming die, and a rolling unit rotatable in reverse direction to the rotation of the forming die and disposed in the orbit thereof for compressive engagement with a moulded article on said die continuously across the entire area thereof as the article is carried therepast on said die.

17. In pulp moulding apparatus, a continuously revoluble forming die, and a continuously revoluble rolling unit rotatable in reverse direction to the rotation of the forming die and disposed in the orbit thereof for compressive engagement with a moulded article on said die continuously across the entire area thereof as the article is carried therepast on said die.

18. In pulp moulding apparatus, a continuously revoluble forming die of open type adapted to receive an aqueous pulp deposit, and a continuously revoluble rolling unit rotatable in reverse direction to the rotation of the forming die and disposed in the orbit thereof for compressive engagement with a moulded article on said die continuously across the entire area thereof as the article is carried therepast on said die.

In testimony whereof I affix my signature.
MERLE P. CHAPLIN.

70

75

80

85

90

95

100

105

110

115

120

125

130