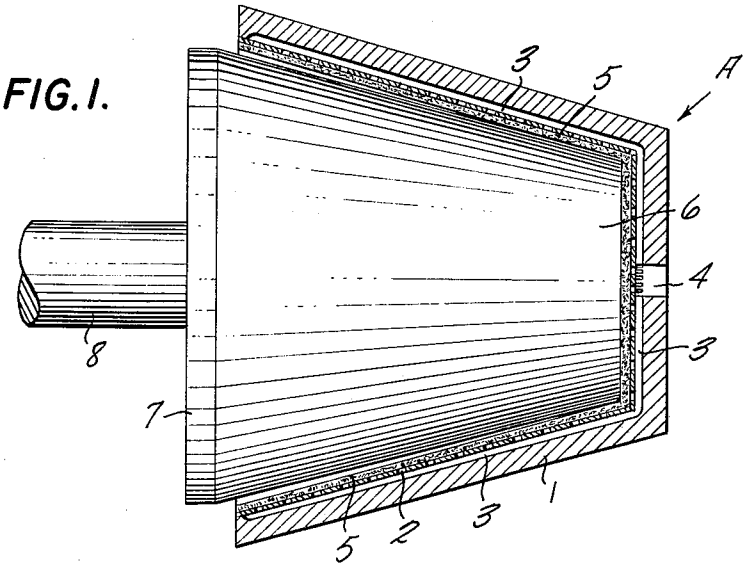
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APPARATUS FOR PRODUCING HOLLOW ARTICLES
BY DEWATERING FIBER PULP
Filed April 5, 1955

FIG. 1.



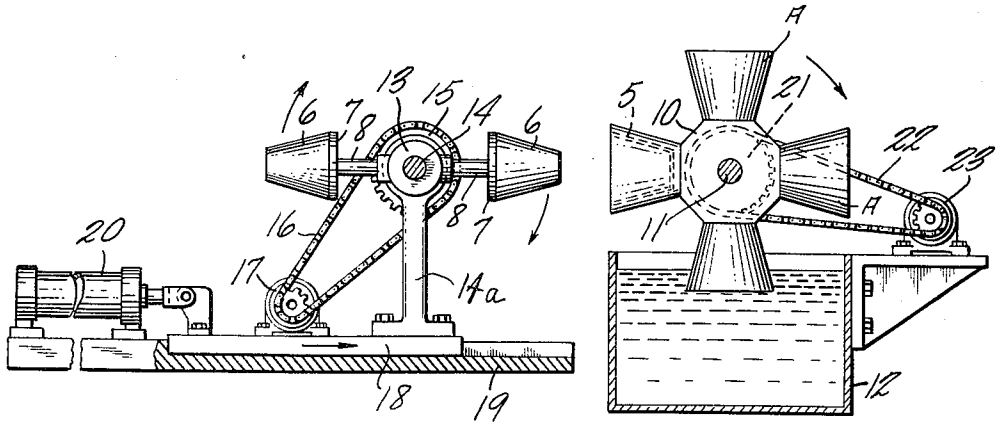


FIG. 2.

INVENTOR.
LEIF FRAS KOXVOLD
BY
ATTORNEY

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APPARATUS FOR PRODUCING HOLLOW ARTICLES BY DEWATERING FIBER PULP

Leif Fråa Koxvold, Oslo, Norway

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Claims priority, application Norway April 10, 1954

4 Claims. (Cl. 162—392)

The present invention relates to a method of producing hollow articles, especially planting pots and the like, by dewatering fiber pulp, in which the pulp by means of suction is deposited in the desired thickness on the inner, perforated walls of a mould and forms a pot which thereafter is taken out and subjected to drying.

By reason of the suction which in commercial practice may be brought to act on the mass within the mould in the time available when a relatively high production rate is to be maintained, the deposited and dewatered article when removed from the mould still has a substantial content of moisture and the article is not reliably self-supporting. At the same time, it requires a subsequent long drying time.

The object of the present invention is to provide a method by means of which the layer of pulp mass deposited and partly dewatered in the mould may be imparted a further mechanical dewatering during which the moisture in the mass is reduced to such a degree that the article requires only a minimum subsequent drying and it possesses a strength which makes possible the necessary handling thereof without any danger of destruction.

The invention relates especially but not exclusively, to the production of relatively thin, slightly conical planting pots from fiber pulp containing peat-dust "Huminal" and cellulose filaments in suitable proportions, and the invention is mainly distinguished by the fact that after the pot is formed from the fiber mass, which by suction has been deposited and partly dewatered on the inner perforated walls of a mould, a plunger or piston of elastic material, preferably rubber, adapted to the cavity of said pot, is inserted into said cavity and, after having contacted the bottom thereof, is imparted an axial thrust effecting axial compression and thereby a circumferential enlargement of the material of the piston, so that said material exerts evenly distributed pressure against the entire inner surface of said cavity so as to compress the mass and effect a further dewatering thereof.

In practice it has appeared that by such further mechanical dewatering the moisture content of the mass, deposited in the mould and partly dewatered by suction, may be further reduced from 18 to 20%, and the pot obtains thereby the desired strength for handling and a reduction in the finishing drying time is also obtained.

The method will be more fully described in the following with reference to the accompanying drawing in which:

Figure 1 shows an axial section through a mould with the pressure piston inserted therein, and

Figure 2 illustrates diagrammatically an apparatus for carrying out the method.

The pots, which have relatively thin walls and are slightly conical, are produced from fiber pulp containing peat-dust "Huminal" and cellulose filaments in suitable proportions.

The form used, generally identified by A, consists of an outer part 1 the inner cavity of which is provided with a lining 2 of perforated sheet metal, the walls of

the cavity facing said lining being provided with closely adjacent slits or grooves 3 communicating with a channel 4 supplying suction from a convenient source (not shown).

In producing a pot the open end of said mould is immersed into the pulp in a container and thereby, due to the suction applied through the channel 4, a layer of fiber mass is deposited in the desired thickness on the inner surface of the perforated lining 2, whereupon the mould is removed from the mass container.

A mandrel or piston 6, having a shape adapted to the inner cavity of the pot is then inserted into said cavity. In order that the end surface of the piston 6 may be able to contact the bottom of the cavity before its circumferential surface comes to rest against the wall surface in the whole depth thereof, the conicity of said piston is a little smaller than that of the cavity. Further said piston has a depth somewhat greater than that of the cavity and the difference in depth may be, say 5%, of the depth of the cavity.

The piston is made from elastic material, preferably rubber, having an elasticity suitable for the purpose, and is at its outer or greatest end secured on a rigid support, preferably a disc 7, arranged on the end of an actuating member, such as a shaft 8.

When the piston is inserted into the pot 5 it rests as above mentioned against the bottom thereof and by continued application of pressure by means of the shaft 8 and disc 7, the material of the piston is compressed in the direction of pressure. Due to its elasticity, the material thereby flows outwardly in a radial direction and is forced evenly against the entire inner surface of the pot and effects thereby a predetermined pressure against the mass of the pot walls so that a further extrusion of moisture therefrom takes place through the perforations and is discharged by the grooves 3.

By adapting the dimensions of the piston 6 and the magnitude of pressure acting thereon in a suitable manner, the moisture of the mass from which water has been removed by the suction may be further reduced by about 20%.

When the pressure on the piston is relieved and the piston retracted, the formed pot follows it and may, when the material of the piston has again assumed its original form, easily be removed therefrom. By using a piston of rubber in the manner above described the tolerances as to the thickness of the layer of mass deposited by means of the suction may be increased considerably. An apparatus for carrying out the method is illustrated diagrammatically in Figure 2.

A number of moulds A, in the present example four, are mounted evenly distributed around the circumference of a support member 10 secured on a rotatable shaft 11. Said shaft 11 is by means of suitable driving means e.g. a sprocket 21, a drive connection 22, and a motor 23, periodically rotatable, each time a quarter of one revolution, so that a pair of vertically opposed moulds is rotated to a horizontal position.

Below the support member 10 is placed a pulp container 12 in such position that the lower mould of a vertically positioned pair, is partly immersed into the pulp in said container.

Adjacent the side of the support member 10 passing upwardly during rotation of said member, is arranged a further support member 13 secured on a rotatable shaft 14 supported in bearing 14*a* carried by a support 18, slidably mounted on a plate 19, the axis of which is parallel with the axis of the shaft 11 and coincides with a horizontal plane therethrough. The support member 13 serves to carry pistons 6 secured on discs 7 mounted at the end of actuating members such as the shafts 8.

Said shafts 8 extend radially from said support mem-

ber 13 in diametrically opposed position as shown. The shaft 14 is by means of suitable driving means e.g. a sprocket 15, a drive connection 16, and a motor 17, periodically rotatable, each time half of one revolution, and in the intermediate periods of rest the common axis of the pistons 6 is horizontal and coincides with the common axis of the horizontally positioned pair of moulds A.

The shaft 14 is supported horizontally movable towards and away from the mould support 10 and the means effecting said movements, e.g. the hydraulic piston 20 acting upon the support 18, is timed to operate during the periods in which the support member 10 is at rest.

During operation of the apparatus with the parts in the positions shown in Figure 2 the lower mould of the vertically opposite pair of moulds is immersed in the pulp in the container 12 and, by suction applied thereto through the channel 4, the mass is deposited in the cavity of said mould as above described.

The shaft 10 now is imparted rotation in clockwise direction a quarter of a revolution so that the mould which was immersed in the pulp is moved to a horizontal position in alignment with the adjacent piston 6. Now the support member 13 is moved horizontally towards the mould, inserting the piston 6 in the cavity of the pot formed therein and exerting pressure against the mass as above explained. The support member 13, after having finished its forward movement, is retracted to its initial position and when the piston 6 during this movement is withdrawn from the mould, the pot adheres to said piston.

Reaching its initial position, the said support member 13 is imparted rotation in clockwise direction, one half of a revolution, so that the opposite piston is moved into operative position. During said rotation the pot disposed on the piston moving downwards falls down onto a suitable transport device or the like.

Simultaneously with the rotation of the support member 13, the support member 10 of the moulds has been rotated to move the next mould from filling position into horizontal press position as will be clearly understood.

The driving gears for the supports may be of any conventional type and are therefore not shown or described in detail.

As will be understood it is possible to provide the support member 10 with a number of circularly positioned rows of moulds arranged side by side in the axial direction thereof, and the support member 13 with a corresponding number of pairs of pistons in order to increase the production accordingly.

I claim:

1. A device for forming flower pots from fiber pulp which comprises, in combination, a mold form of generally frusto-conical configuration having an apertured lining, said lining being in the shape of the flower pot to be formed and including a bottom portion and an outwardly diverging wall portion defining a cavity, and a piston member mounted for reciprocation into and completely out of the cavity defined by said lining, said piston member having a shaft portion and a head, the head being formed from a unitary solid body of rubbery elastic material of generally frusto-conical configuration and having an end portion and a diverging wall portion having a length greater than that of the diverging wall portion of the lining, the angle formed between the diverging wall portion and the bottom portion of the head being less than the angle formed between the wall portion and the bottom portion of the lining, said head defining a space between the outer surface of said head and the inner surface of said mold form, gradually increasing in diameter continuously from the bottom portion outwardly.

2. A device for forming flower pots from fiber pulp which comprises, in combination, a mold form of generally frusto-conical configuration having an apertured lining spaced from the interior wall surface of the mold to provide a space therebetween for evacuation of air and water, means for connecting said space to a vacuum source, said lining being in the shape of the flower pot to be formed and including a bottom portion and an outwardly diverging wall portion defining a cavity, and a piston member mounted for reciprocation into and completely out of the cavity defined by said lining, said piston member having a shaft portion and a head, the head being formed from a unitary solid body of rubbery elastic material of generally frusto-conical configuration and having an end portion and a diverging wall portion having a length greater than that of the diverging wall portion of the lining, the angle formed between the diverging wall portion and the bottom portion of the head being less than the angle formed between the wall portion and the bottom portion of the lining, said head defining a space between the outer surface of said head and the inner surface of said mold form, gradually increasing in diameter continuously from the bottom portion outwardly.

3. A device for forming flower pots from fiber pulp which comprises, in combination, a first rotatable support member, a plurality of mold forms carried by said support in radially-outwardly extending position with respect to the axis of rotation of the support member, said forms lying in a plane perpendicular to said axis, a vat in alignment with said plane to receive said forms selectively as the support is rotated, each mold form being of generally frusto-conical configuration and having an apertured lining, said lining being in the shape of the flower pot to be formed and including a bottom portion and an outwardly diverging wall portion defining a cavity, and at least one piston member receivable in the cavity defined by said lining, a second rotatable support member carrying said piston member and being movable toward and away from said first support member with the piston member in alignment with one of said forms to move the piston member into and completely out of said cavity, said piston member having a shaft portion secured to said second support member and a head, the head being formed from a unitary solid body of rubbery elastic material of generally frusto-conical configuration and having an end portion and a diverging wall portion having a length greater than that of the diverging wall portion of the lining, the angle formed between the diverging wall portion and the bottom portion of the head being less than the angle formed between the wall portion and the bottom portion of the lining, said head defining a space between the outer surface of said head and the inner surface of said mold form, gradually increasing in diameter continuously from the bottom portion outwardly.

4. A device for forming flower pots from fiber pulp which comprises, in combination, a first rotatable support member, four mold forms carried by said support in radially-outwardly extending position with respect to the axis of rotation of the support member, said forms being equally spaced circumferentially and lying in a plane perpendicular to said axis, a vat in alignment with said plane to receive said forms selectively as the support is rotated, each mold form being of generally frusto-conical configuration and having an apertured lining spaced from the interior wall surface of the mold to provide a space therebetween for evaporation of air and water, means for connecting said space to a vacuum source, said lining being in the shape of the flower pot to be formed and including a bottom portion and an outwardly diverging wall portion defining a cavity, a pair of piston members receivable in the cavity defined by said lining, a second rotatable support member carrying said piston members in opposite radially-extending position and being movable toward and away from said

first support member with each piston member selectively in alignment with one of said forms to move the aligned piston member into and completely out of said cavity, each piston member having a shaft portion secured to said support member and a head, the head being formed from a unitary solid body of rubbery elastic material of generally frusto-conical configuration and having an end portion and a diverging wall portion having a length greater than that of the diverging wall portion of the lining, the angle formed between the diverging wall portion and the bottom portion of the head being less than the angle formed between the wall portion and the bottom portion of the lining, said head defining a space between the outer surface of said head and the inner surface of said mold form, gradually increasing in diameter continuously from the bottom portion outwardly.

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