

Dec. 11, 1934.

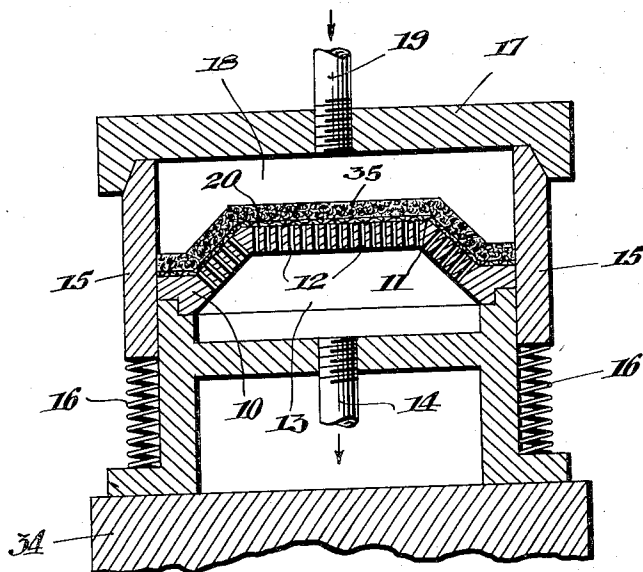
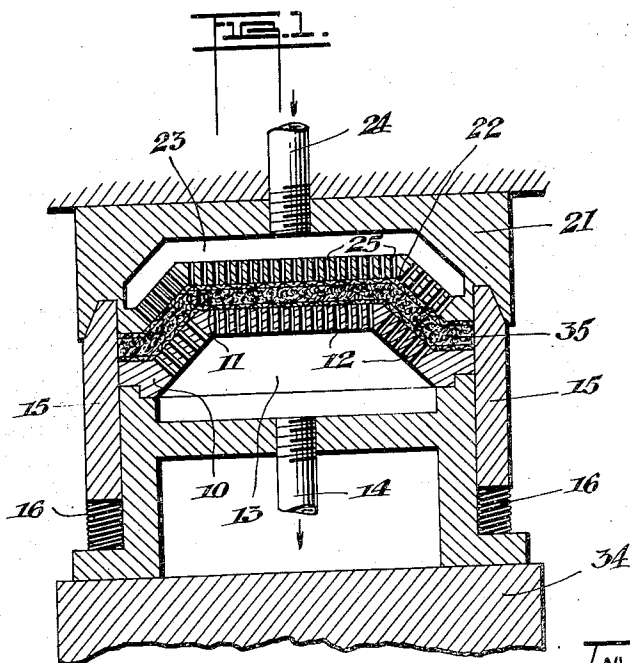
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APPARATUS FOR THE PRODUCTION OF PRESSED FIBROUS ARTICLES

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

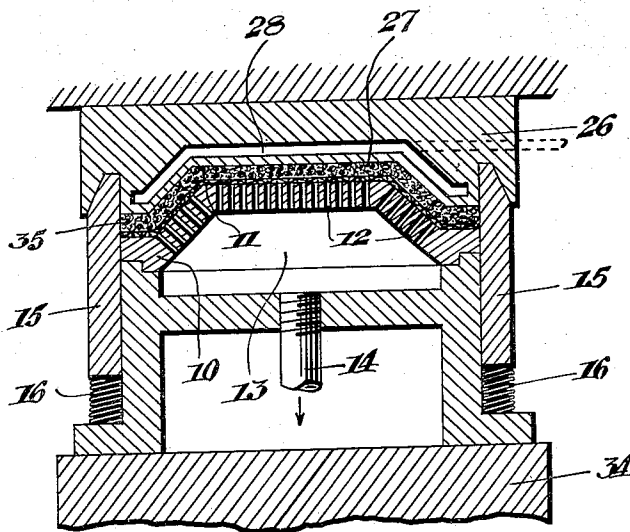


FIG. 3.

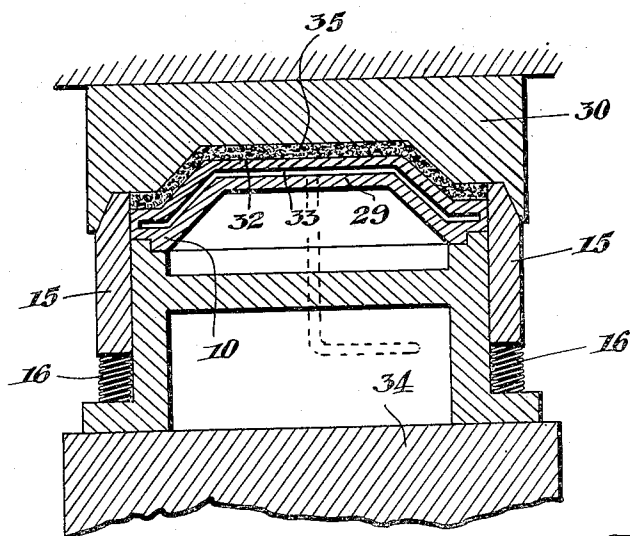


FIG. 4.

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APPARATUS FOR THE PRODUCTION OF
PRESSED FIBROUS ARTICLESGeorge James Manson, Hawkesbury, Ontario,
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3 Claims. (Cl. 92—54)

This invention relates to improvements in apparatus for the production of pressed fibrous articles such as dishes, trays, food containers and the like and the objects of the invention are to provide an improved apparatus for the production of such articles which may have one or more smooth surfaces free from drainage markings and without discoloration or hydration of fibrous stock.

10 The improved apparatus consists in the construction and arrangement, all as hereinafter more particularly described and illustrated in the accompanying drawings in which,

15 Figure 1 is a diagrammatic vertical section of a lower die and closure cap therefor forming part of the apparatus.

Figure 2 is a vertical section of this lower die in cooperation with an upper die.

20 Figure 3 is a vertical section of the lower die in cooperation with a smooth-faced heated upper die.

Figure 4 is a vertical section of a smooth-faced heated lower die in cooperation with a smooth-faced unheated upper die.

25 In the drawings like characters of reference indicate corresponding parts in the different views.

30 The apparatus comprises a lower die 10 which is provided with a forming face 11 provided with drainage perforations 12 therein.

Beneath the drainage perforations is a suction chamber 13 having a suction pipe 14 communicating therewith. The lower die 10 has slidably mounted thereon a cylindrical guard 15 which is normally urged upwardly by springs 16. A closure cap 17 (see Figure 1) is adapted to cooperate with the lower die 10 and form a closure for a reservoir 18 formed above the forming surface 11 of the lower die. A pressure pipe 19 extends through the closure cap 17 and communicates with the reservoir 18. The forming surface 11 of the lower die is covered by wire mesh cloth 20.

45 An upper die 21 (see Figure 2) is adapted to cooperate with the lower die 10 and this upper die 21 is formed with a forming surface 22 opposed to the forming face 11 of the lower die 10.

50 Within the upper die 21 is a pressure chamber 23 with which a pressure pipe 24 communicates. The forming surface 22 of the upper die 21 is provided with drainage perforations 25 which communicate with the pressure chamber 23.

55 A further upper die 26 (see Figure 3) is adapted to cooperate, in another step during the forma-

tion of the article, with the lower die 10 and this upper die 26 is provided with a smooth surface 27 and may be heated in any desired way and in the form illustrated it is shown formed with a heating chamber 28 to which may be fed any desired heating medium such as steam, oil or other suitable heating medium but my invention is not limited to any particular manner of heating.

A heated lower die 29 (see Figure 4) is adapted to cooperate in a further step during the formation of the article with a smooth faced unheated upper die 30. This lower die 29 is provided with a smooth forming surface 32 which may also be heated in any desired manner as in the case of the upper die 26 shown in Figure 3 and in the form shown the lower die is provided with a heating chamber 33.

In Figures 3 and 4, while I have shown a heating chamber for heating the upper and lower dies 26 and 29, I do not desire to limit myself to any particular manner of heating as this might be done in various suitable ways, such as by electricity.

25 The lower dies in each case may be mounted in any suitable way so that they may be pressed with substantial pressure against the upper dies, such as upon a hydraulic ram 34.

A pressed fibrous article being formed in the apparatus is indicated by the numeral 35.

30 In forming pressed fibrous articles in my improved apparatus the liquid stock is fed into the reservoir 18 (see Figure 1) and the apparatus is brought into the position shown in Figure 1 in which the cap 17 forms a closure for this reservoir. Air pressure is fed through the pipe 19 and the pipe 14 is connected to a source of suction and in this operation a large amount of the moisture is expelled and the article 35 is partially formed. The lower die 10 carrying the partially formed article 35 is then pressed against the upper die 21 (see Figure 2) and the moisture content is further reduced by pressure.

45 At the end of the operation shown in Figure 1 the article is about 20% to 25% pulp due to the air pressure on top, that is, the great bulk of the water has been expelled which makes the pressing operation of Figure 2 much more simple. Instead of applying the cap 17 and air pressure I find that I may, in this stage, simply apply a strong suction to pipe 14 with atmospheric pressure on top.

50 Ordinarily, the moisture would be retained by capillary action in the drainage perforations of the dies and in the wire mesh cloth and, when the dies are opened at the completion of the op-

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eration shown in Figure 2, this moisture would be drawn back into the article 35, thus seriously lowering the drying efficiency of the pressing operation. This difficulty is entirely eliminated by my improved apparatus as follows.

In the operation shown in Figure 2, while the moisture content is reduced by pressure, simultaneously with the pressing operation, air under pressure is led through the pipe 24 and the pipe 14 is connected to a source of suction, so that all moisture is withdrawn from the drainage perforations of the dies and from the wire cloth so that the maximum drying efficiency of this pressing operation is maintained, and when the dies are opened there is no moisture held therein to be drawn back into the article. This is a very important consideration and I have found that with my improved apparatus it is possible to expel in excess of 45% of the moisture during these initial pressing operations.

During this pressing operation, described and shown in Figure 2, it will be noted, air is forced or blown through the drainage perforations 25 in the upper die 21, transversely through the screen covering the forming face 22 of the upper die 21, transversely through the article 35, and screen covering the forming face 11 of the lower die 10, through the drainage perforations 12 of this lower die and finally passes out through the suction pipe 14.

It is most desirable that the greatest possible amount of moisture be removed during these initial pressing operations, since its removal by simple pressure is much more economical than by heating and furthermore by expelling a large amount of the water from the article so that it is relatively dry before it is presented to a heating surface there is no surface hydration of the fibres with consequent discoloration of the article.

After completion of the operation illustrated in Figure 2 the lower die 10 carrying the article 35 is pressed with substantial pressure against the upper die 26 (see Figure 3).

This upper die 26 has a smooth forming surface and is heated to a relatively high temperature so as to produce a smooth surface on the face of the article presented to this upper die.

In the operation illustrated in Figure 3 the pipe 14 is connected to a source of suction and therefore any steam or vapour formed is withdrawn through the pipe 14.

At the completion of the step shown in Figure 3 I have produced a pressed fibrous article having a smooth surface on one face thereof, which face is entirely free from drainage markings.

If it is desired to produce a smooth surface on both faces of the articles, a further and final step illustrated in Figure 4 is employed.

In this step the article 35 is pressed between the dies 29 and 30 both of which have smooth faces and the lower die 29 being heated to a relatively high temperature and being pressed against the article with substantial pressure, a smooth surface without drainage markings is produced on the face of the article in contact with the lower die 29.

In this operation illustrated in Figure 4, since

the faces of both the upper and lower dies are smooth, it will probably be necessary to make some provision for the escape of steam or vapour and this could be done in any well known suitable way, such for instance as giving the ram 34 a vibratory motion so that the pressure between the dies would be intermittent, and thus permit the vapour to escape from therebetween.

At the completion of the final step shown in Figure 4 I have produced a pressed fibrous article having a smooth surface on both faces thereof and entirely free from drainage markings.

From the foregoing it will be apparent that I have devised an improved apparatus of the type described, whereby the objects of my invention have been attained.

In the drawings a purely diagrammatical form of the apparatus has been illustrated and it is to be understood that I do not confine myself to the exact details of the construction shown.

Various modifications may be made in my invention without departing from the spirit thereof or the scope of the claims and therefore the exact form of apparatus shown and described is to be taken as illustrative only and not in a limiting sense, and I desire that only such limitations shall be placed thereon as shall be imposed by the prior art or are specifically set forth in the claims.

What I claim as my invention is:—

1. Apparatus for the production of thin pressed fibrous articles comprising an unheated perforated die, means for pressing the article therein, means for simultaneously with said pressing operation establishing an air current transversely through the article and die, means for subsequently subjecting the article to a further drying action by heat and actual mechanical pressure between dies, and suction means for exhausting the vapor generated in said last mentioned heating and pressing operation.

2. Apparatus for the production of thin pressed fibrous articles comprising an unheated perforated die, means for pressing the article therein, means for simultaneously with said pressing operation establishing an air current transversely through the article and die, means for subsequently subjecting the article to a further drying action by heat and actual mechanical pressure against a smooth die, and suction means for exhausting the vapor generated in said last mentioned heating and pressing operation.

3. Apparatus for the production of thin fibrous articles comprising co-operating unheated upper and lower perforated forming dies adapted to form the article by actual mechanical pressure therebetween, means for causing a flow of air transversely through the upper die, the unheated article and the lower die simultaneously with the pressing operation, a smooth faced heated die and an unheated die co-operating therewith adapted to press the previously formed article against the heated die, the unheated die provided with drainage perforations, and a suction outlet communicating with said perforations.

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