Feb. 2, 1960 R. WELLS 2,923,068

DRYING DIE

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Fig. 1.

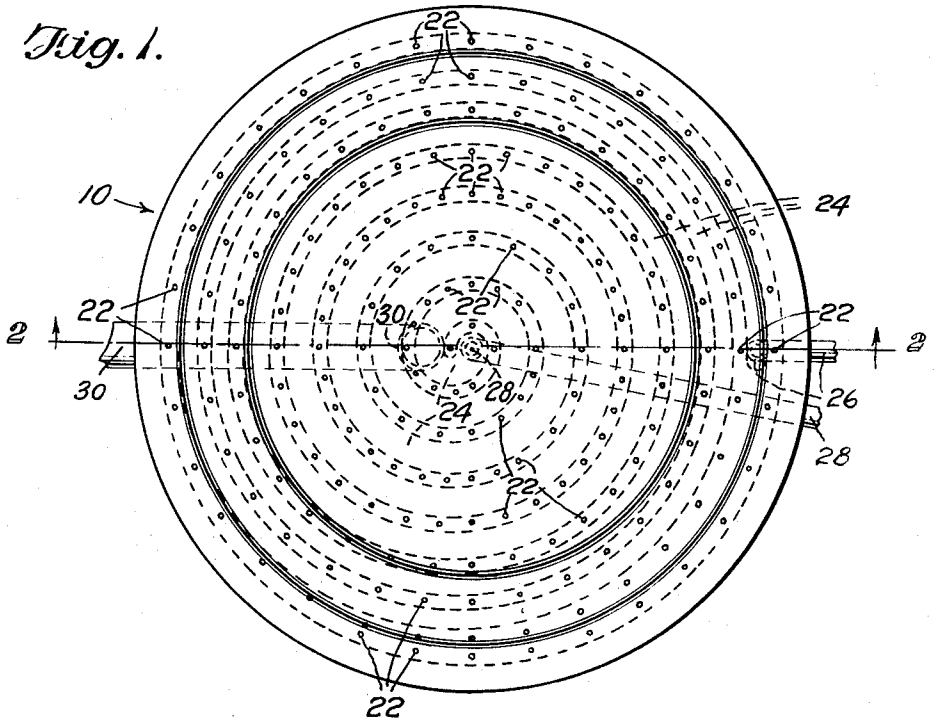
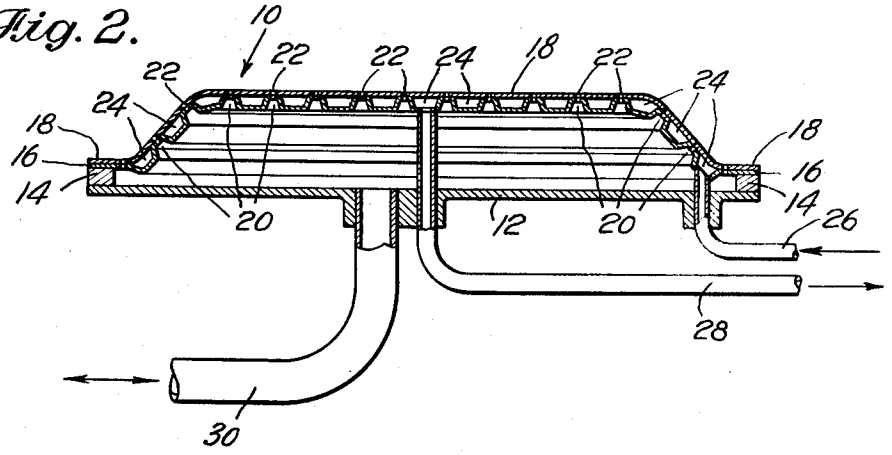


Fig. 2.



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DRYING DIE

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2 Claims. (Cl. 34—104)

The present invention relates to a drying die for use in conjunction with a molded pulp machine, and more particularly to a drying die made of sheets of metal joined together.

In the molding of articles of paper pulp, the articles are formed by depositing a layer of pulp from a liquid slurry onto a forming die, and then transferring the article to a drying die, in order to allow the article to dry out and be of the proper shape.

Drying dies in use today have several known disadvantages: they have lower than desirable heat transfer characteristics, and they are heavy, bulky and expensive. In addition, dies in use at the present time are so constructed that water from the article being dried remains in contact with the surface of the die for a relatively long time. This is the result of either a squeezing action exerted by a matching die or merely the vacuum applied to the die, but in either case there is a build-up of deposits on the die surface. This build-up necessitates the stopping of not only the molding machine of which the dies are a part, but also certain allied equipment. It will be readily understood that the stopping of the equipment is economically undesirable, so that much gain will be derived from a construction which permits longer periods of operation and consequently less frequent, or no, "down times."

It is an object of the present invention to provide a drying die which will have improved heat transfer characteristics.

It is a further object of the present invention to provide a drying die which is light, compact and relatively cheap to manufacture.

It is a further object of the present invention to provide a drying die which will substantially eliminate the necessity for cleaning.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a plan view of the drying die made in accordance with the present invention.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Referring now to the drawings, there is shown in Figs. 1 and 2 a drying die **10** comprising a back plate **12** and having a ring **14** extending therearound. Supported on the ring **14** is a lower die plate **16** and above that an upper die plate **18**.

Certain of the regions of the upper die plate **18** and lower die plate **16** are joined together. Specifically, the plates **16** and **18** are joined together, as by welding, throughout the spiral area **20**. Through the welded spiral area **20** there extend a plurality of drainage holes **22**, these holes **22** extending completely through the lower plate **16** and upper plate **18**. Whereas the plates **16** and **18** are joined together and are in intimate contact along the area **20**, between the convolutions of the area **20** there is a second area **24** in which the plates **16** and **18** are separated from each other, as best seen in Fig. 2. A

heating fluid inlet duct **26** is connected to the area **24** at one end thereof and an outlet duct **28** is connected to the area **24** at the other end thereof, it being understood that due to the separation of the plates along area **24**, there is a continuous passageway formed in the drying die **10**, and it is to this passageway that the ducts **26** and **28** are connected. The ducts **26** and **28** extend through appropriate holes in the back plate **12**, as shown in Fig. 2. There may also be seen in Fig. 2 a conduit **30** connected to the back plate **12**, and through this conduit **30** either vacuum or blow-off air is supplied, as desired.

It will be understood that the die constructed as above may be fabricated rapidly and cheaply from known materials and techniques. For example, the upper and lower plates **16** and **18** are preferably made up of non-corrosive material, and may be made initially of two plates substantially contiguous throughout that area, and formed in the desired pattern; fluid under high pressure may then be caused to flow through the unwelded area **24**, and because of the greater ductility of the lower plate **16**, it will be deformed into the manner indicated in Fig. 2. Alternatively, the plates **16** and **18** may be formed, as by stamping, to the necessary shapes, and then welded together to provide the structure shown in the figures of the drawing.

When the drying die of the present invention is in use on a drying table, a relatively wet molded pulp article will be placed upon the die **10** for drying. A heated fluid, such as steam, will be caused to flow into the inlet duct **26**, through the conduit formed by the area **24**, and steam and condensate caused to flow out of the outlet duct **28**. The heat thus transferred to the drying die **10** from the heated fluid will cause the article on the drying die **10** to dry out. In certain installations, the holes **22** may not be necessary, and thus may be eliminated, along with the conduit **30**. Alternatively, the holes **22** may be provided and the liquid from the article permitted to pass therethrough and into the atmosphere, the back plate **12** and conduit **30** not being necessary in this configuration, also. However, in those installations where the sucking away of the liquid from the article is deemed necessary, a vacuum will be applied through the conduit **30** to aid in drawing the liquid from the article through the holes **22**. When the drying of the article has been completed to the desired degree, blow-off air may be supplied through the conduit **30**, this air passing under pressure through the holes **22** and causing the separation of the article from the die **10**.

It will be understood that although the areas **20** and **24** have been shown and described as spiral areas, this particular configuration is only preferred, it being only necessary for the functioning of the device that the area **24** simply provide a passageway between the inlet and outlet ducts.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A drying die comprising a back plate, a ring-like member secured to said plate at the periphery thereof, a pair of die plates secured to said ring-like member, said die plates being secured together in sealed relationship at their peripheries, one of said die plates being an upper shaped die plate adapted to have a wet molded pulp article applied directly onto the upper surface thereof, the other die plate being a lower die plate, said lower die plate being of undulated configuration relative to the upper die plate and having the peaks of the undulations secured to the underside of the upper die plate, said die plates being separated from each other between the peaks

of the undulations to provide space between said plates, first and second spaced ducts connected to the lower die plate and communicating with said space, a third duct connected to said back plate, and drainage holes through the contacting regions of said plates.

2. A drying die comprising a back plate, a pair of die plates of impervious material secured to said back plate, said die plates being secured together in sealed relationship at their peripheries, one of said die plates being an upper shaped die plate adapted to have a wet molded pulp article applied directly onto the upper surface thereof, the other die plate being a lower die plate, said lower die plate being of undulated configuration relative to the upper die plate and having the peaks of the undulations secured to the underside of the upper die plate, said die plates being separated from each other between the peaks of the undulations to provide space between said plates,

first and second spaced ducts connected to the lower die plate and communicating with said space, a third duct connected to said back plate, and drainage holes through the contacting regions of said plates.

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