Aug. 10, 1937. W. C. GRAY 2,089,746

HEAT TRANSFER DIE

Filed Feb. 4, 1935

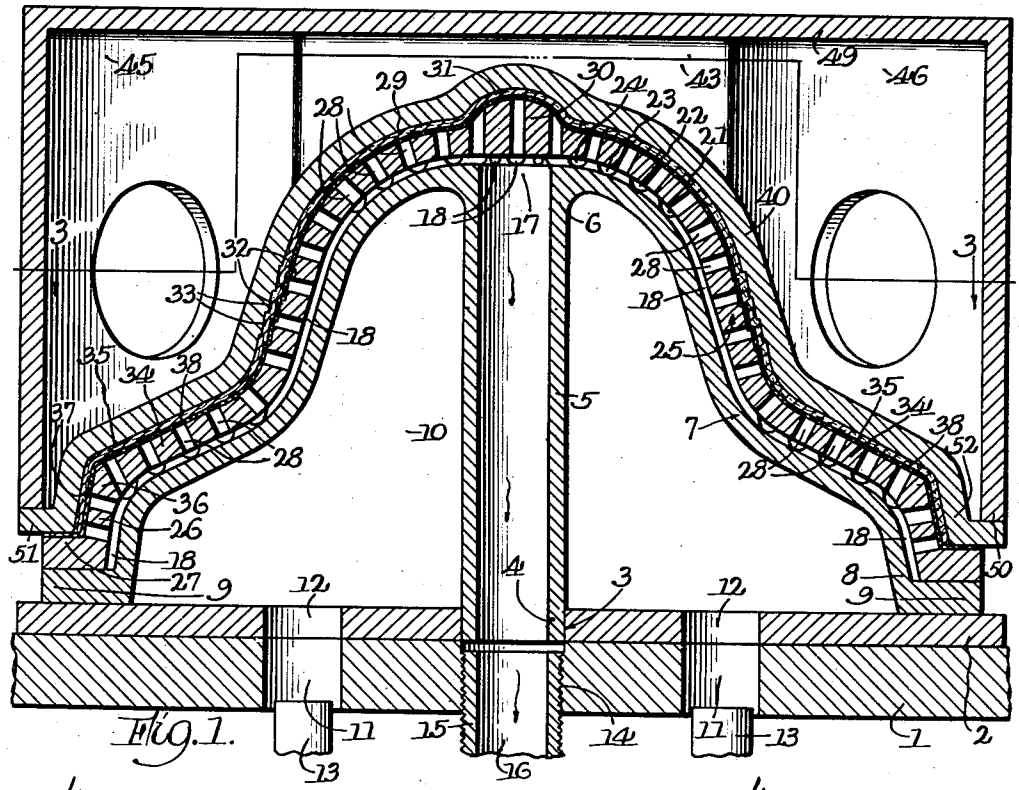


Fig. 1.

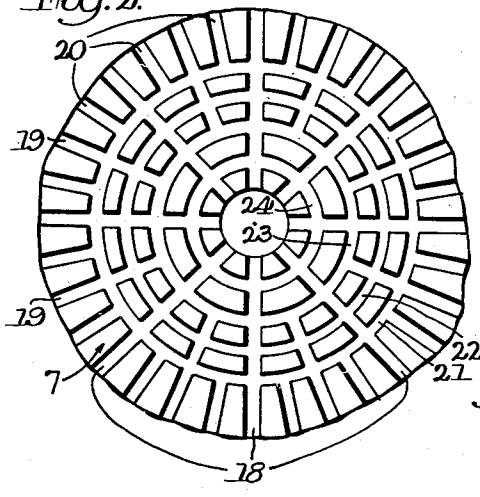


Fig. 2.

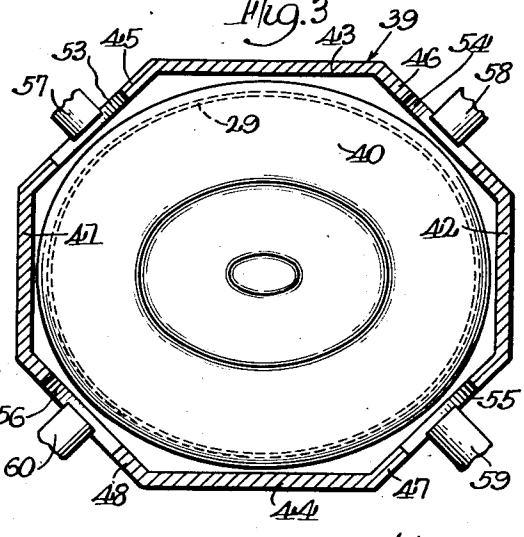


Fig. 3.

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HEAT TRANSFER DIE

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7 Claims. (Cl. 223—12)

The present invention relates to dies and more particularly to such for transferring heat to the article to which the heat is to be transferred.

Among the objects of the invention is to provide a novel die means so designed and constructed as to transfer heat to the article being acted upon by the dies.

When making fibrous articles of accreted fibres, the process is usually carried out by submerging a porous contoured molding or forming die in a bath of water and suspended fibres while at the same time causing a suction of the water through the apertures or pores of the die so as to accrete on the surface of the die a stratum of interlaced fibres. The wet blank thus formed is then transferred to a drying and finishing die for compressing the blank to desired finished form and for drying it in that form by heat. Such an article may be made in accordance with the process and by the means disclosed in the co-pending applications of Jesse B. Hawley and Edward C. Sloan et al. Serial No. 4,866 and Serial No. 4,862, respectively, and both filed February 4, 1935, the latter being assigned as is this application to said Jesse B. Hawley.

The present invention, therefore, relates to a novel drying and finishing die.

Other objects, advantages, capabilities, features and the like are comprehended by the invention as will later appear and as are inherently possessed thereby.

Referring to the drawing;

Fig. 1 is a vertical sectional view through a die means constructed in accordance with the invention;

Fig. 2 is a fragmentary top plan view of a part of the male die; and,

Fig. 3 is a horizontal sectional view taken in planes represented by line 3—3 in Fig. 1 of the drawing.

Referring more in detail to the drawing the embodiment selected to illustrate the invention is disclosed in connection with a table or platen 1 to the top of which is clamped a platen 2 having a central opening 3 in which is secured the lower end portion 4 of a tube 5 preferably formed integrally at its upper end portion 6 with a contoured male die part or member 7 having at its lower edge or border portion 8 a flange 9 seated upon the platen 2, as clearly shown in Fig. 1 of the drawing.

The die part 7 encloses a chamber 10 in which is introduced any suitable heating medium, such as hot products of combustion. When using the latter, the platens 1 and 2 are provided with openings or passages 11 and 12 at suitable points convenient for the locating of burners 13 the flames from which may project through the passages 11 and 12 and into the chamber 10 to heat the die 7. The platen 1 has a central opening 14 in which is secured the upper end portion 15 of a duct 16 leading to a suitable source of suction.

The die part 7 is imperforate except at its uppermost part it has an opening 17 which is common with the open upper end portion 6 of the duct 5.

On the outer surface of the die part 7 are provided a number of grooves or channels 18 disposed more or less radially and leading from the flange 9 to the top of the die part and into the opening 17. Similarly are provided shorter channels or grooves 19 and 20. There are also provided a number of cross channels or grooves 21, 22, 23 and 24, more or less in circular or oval form depending upon the shape of the die. These cross channels establish communication between and among the radially disposed channels 18, 19 and 20, so that steam, moisture, vapors, and the like may pass to and arrive at the opening 17 and be drawn out by way of the ducts 5 and 16, as will later more fully appear.

Upon the die part 7 is placed another die part 25 of the same shape or contour on its inner surface as that on the outer surface of the die part 7 with the exception of the grooves. The lower edge or border portion 26 of the die part 25 has a flange 27 which is seated on the flange of the die part 7. The wall of the die part 25 is provided with a plurality of apertures or holes 28.

The outer surface of the die part 25 is contoured in accordance with the desired contour to be given to the article to be acted upon by the die means. In the specific case selected to illustrate the use of the invention, the article to be acted upon is a hat blank 29 which has been accreted on a porous molding or forming die and transferred to the die of this invention for finishing. Accordingly the die part 25 has at the top a boss 30 for forming a similar boss 31 in the blank in representation of a knot, and stepped parts 32 to form similar features 33 in the blank in representation of folds or pleats, and a brim portion 34 to form a brim 35 in the blank, and a rim portion 36 to form a rim 37 in the blank. (See Fig. 1.)

Upon the outer contoured surface of the die part 25 is located a thin fine mesh screen 38 having the same shape or contour as the outer surface of the die part 25. Upon this screen is placed the hat blank 29 which has the same contour and was given that contour on the molding

or accreting die and from which it was transferred to the die means of this invention.

Over and upon the hat blank is a female die having a wall 40 the inner surface of which is contoured to give the desired finished surface and shape to the outside of the hat blank. This die also includes an outer casing 39 of polygonal form or shape as shown in Fig. 3, comprising end walls 41 and 42, side walls 43 and 44, angle walls 45, 46, 47 and 48, and a top wall 49. The lower edge portion 50 of this casing seats upon a flange 51 formed at the lower edge portion 52 of the wall 40. The angle walls 45, 46, 47 and 48 have openings 53, 54, 55 and 56 through which flames from burners 57, 58, 59 and 60 project into the interior of the casing to apply heat to the female die wall 40.

In operation the die part 7 is heated to the desired temperature, and the die part 25 with the screen 38 are placed upon the die part 7 so as to be heated by the die part 7. A wet blank or partly wet blank is then transferred from the molding die and placed upon the screen, and then the female die brought over it to press against the blank to compress it. The burners 57, 58, 59 and 60 are located in place to heat the wall 40. The steam, vapors, moisture and the like formed pass through the screen 38 and the holes 28 to the grooves or channels in the outer surface of the die part 7, from whence they pass to the ducts 5 and 16. The blank is thus thoroughly dried while under pressure so that it will have a definite finish with a well defined contour.

While I have herein disclosed an illustrative embodiment of the invention it is to be understood that the invention is not limited thereto but comprehends other constructions, details, arrangements of parts, features, and the like, without departing from the spirit of the invention.

Having thus disclosed the invention, I claim:

1. A heat transfer die for supplying heat to an article to be acted upon by the die, comprising a contoured wall conforming to the form of the article to be acted upon and being provided with an opening for the passage therethrough of gaseous and vaporous substances escaping from the article when affected by the heat supplied by the die, the surface of said wall being provided with channels for the conducting of said gaseous and vaporous substances to said opening, certain of said channels leading to and communicating with said opening and others of said channels being disposed transversely to and in communication with the previously mentioned channels, and a duct connected to said wall at said opening for conducting away said gaseous and vaporous substances.

2. A heat transfer die for supplying heat to an article to be acted upon by the die, comprising a contoured wall conforming to the form of the article to be acted upon and being provided with an opening for the passage therethrough of gaseous and vaporous substances escaping from the article when affected by the heat supplied by the die, a duct connected to said wall at said opening for conducting away said gaseous and vaporous substances, said wall having channels therein communicating with said duct, a die wall having a metal to metal connection with said wall, a platen being so constructed and arranged in relation to said wall as to provide a heating chamber between said wall and said platen.

3. A heat transfer die means for drying an article comprising a platen, a die having a contoured wall provided with an opening therein, an exhaust duct connected to said opening and extending through said platen, the outside surface of said wall having a plurality of channels therein, a die wall in direct contact with said member and having a plurality of holes communicating with said channels, and an imperforate die juxtaposed on said first die, both said dies having means for heating therein.

4. A heat transfer die means for pressing and drying an article comprising a contoured die having an inner and outer wall, an exhaust duct extending therefrom, the outer wall of said die having holes therein, the inner wall being provided with channels and cross channels leading from said holes to the duct, means for heating said die, an opposing die, means for heating said opposing die.

5. A heat transfer die comprising an apertured wall having an outer shaping surface and an inner surface which has a contour corresponding to that of said shaping surface, a second wall which is imperforate except for an outlet opening therein, and provided with a contoured surface complemental to the contour of the apertured wall, and arranged in juxtaposition with the inner surface of said apertured wall, the contoured surface of the second wall having channels therein so positioned as to communicate with said outlet opening, and an outlet duct also communicating with said opening.

6. A heat transfer die comprising an imperforate wall having an opening therein, said wall being so constructed and arranged as to provide a chamber for a heating medium adapted to heat the wall, an apertured wall, said walls having adjacent complemental contoured surfaces arranged in juxtaposition, the complemental surface of one of said walls having channels therein so positioned as to communicate with the opening in said imperforate wall, and an outlet duct also communicating with said opening.

7. A heating die comprising two hollow members, each hollow member having an imperforate wall provided with a contoured surface spaced from a similarly contoured complemental surface of the imperforate wall of the other hollow member, said hollow members being so constructed and arranged as to provide chambers for heating media adapted to heat the respective complemental imperforate walls, an intermediate apertured wall having a contour complemental to the complemental contours of the imperforate walls and interposed between said imperforate walls, and means for conducting away any gaseous and vaporous substances which may be developed in the spaces between said imperforate walls and said apertured wall.

WILLIAM C. GRAY.