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M. P. CHAPLIN
HEATED DIE PLATEN AND DIE

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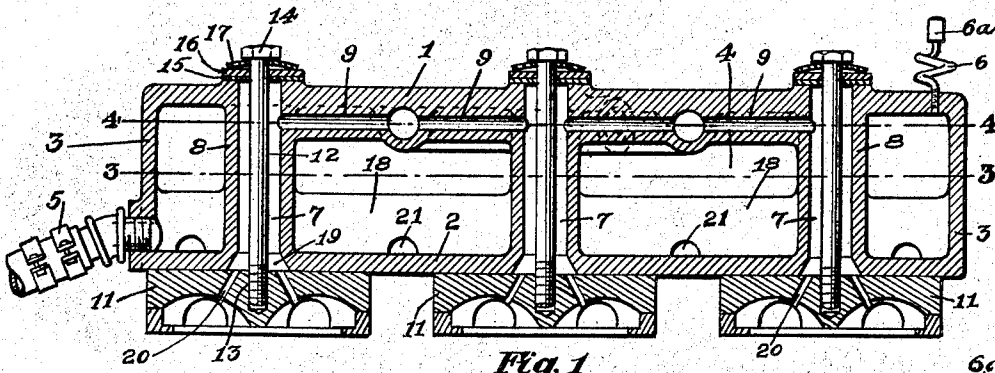


Fig. 1

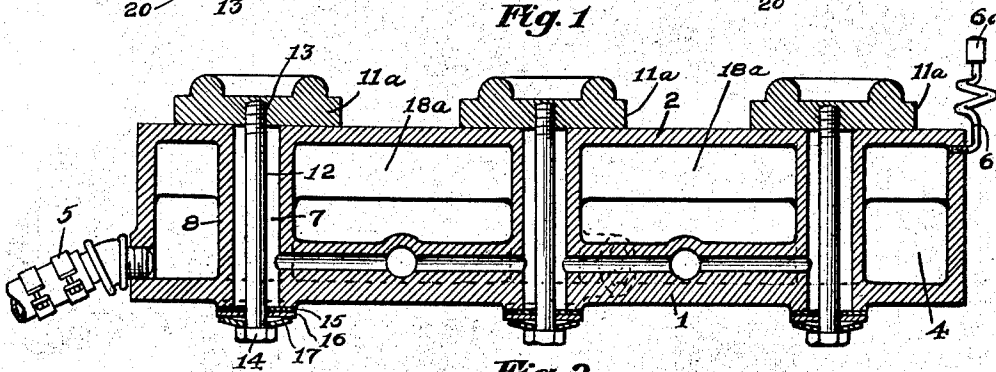


Fig. 2

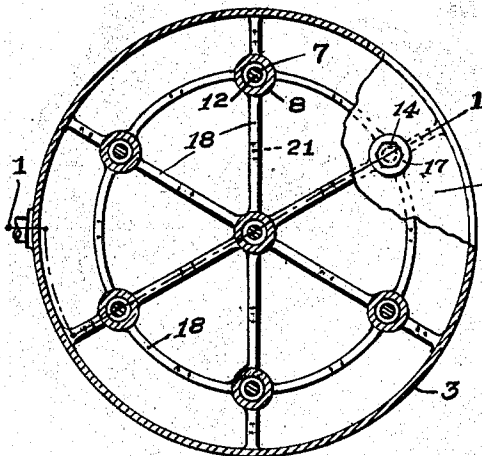


Fig. 3

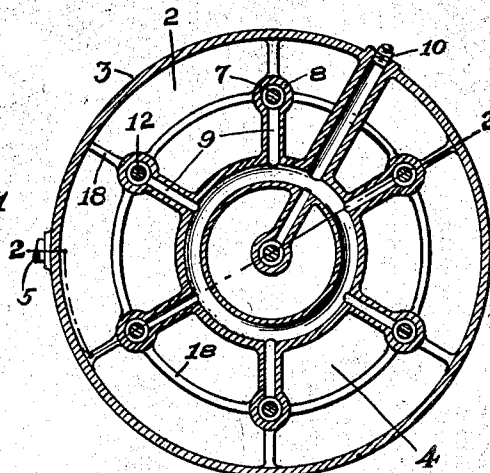


Fig. 4

Inventor,

Merle F. Chaplin.

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HEATED DIE PLATEN AND DIE

Merle P. Chaplin, South Portland, Maine, assignor to Chaplin Corporation, South Portland, Maine, a corporation of Maine

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It is frequently desirable and necessary to heat formers and dies used in the finishing, drying or other treatment of moulded pulp articles. Individual dies may be provided with electrical or other heating means included within the die itself. When these dies are changed or discarded not only is the die, itself, lost to useful and gainful production, but also the heating element or means. Where a considerable number of spare or extra dies must be maintained, much added capital is necessarily tied up in dies, which contain both the die member, itself, and its individual heating means.

In addition, it is frequently necessary that these heated or drying dies be provided with openings, perforations, or other means therein or therethru, to permit the escape of steam or water vapor which may be evaporated from the articles held on or between these dies.

It is the purpose of this invention to provide a universal die heating mechanism whereon dies of various shapes and kinds can be readily mounted. This die heating and mounting mechanism not only provides heat for the dies themselves, but also provides means for escape or extraction of the water vapor from the dies and from any articles held or compressed by them. This enables the very simplest and most inexpensive of die construction to be used, means being provided to easily and quickly mount dies of different shapes, kinds and numbers, on a universal heating and vapor removing mechanism.

Fig. 1 is a sectional view through a preferred form of die heating mechanism, including one form of die mounted thereon for purposes of illustration. This particular mechanism is designed to have the dies mounted on its bottom surface, the working die surface facing downward.

Fig. 2 is a cross sectional view through a die heating mechanism, showing one form of die mounted thereon. This mechanism is designed to have the dies mounted on its top or upper surface with the working surface of the dies facing upward.

Fig. 3 is a cross section on line 3—3 of Fig. 1.

Fig. 4 is a cross section on line 4—4, of Fig. 1.

For purposes of illustration, it is assumed that the die heating and mounting mechanism herein illustrated, is to be heated by steam or similar heat carrying vapor, which by condensation, releases its latent heat to the mechanism or structure with which it is in contact. I do not limit my invention to this particular method of heating, as it is obvious that a liquid or other similar

medium can be circulated through my device adequately heating it and performing necessary functions without departing from the scope of my invention.

Considering the sectional view of Fig. 1, the structure consists of a casing having an upper wall or face 1, a lower wall or face 2, and an enclosing wall 3, of circular or other desired shape. These enclosing walls encompass a chamber 4, communication to which is made 10 by a pipe or hose connection 5. Through this pipe or hose connection may be introduced steam, or other heating vapor filling the chamber 4 and heating the entire mechanism. The condensed vapor may either be drawn off through 15 a separate pipe communicating with chamber 4, or preferably, drained back through the pipe and hose 5, and be thereafter separated from incoming vapor. Any air which may be in the chamber 4, escapes through pipe 6 and air vent 6—*a*. 20

The particular mechanism illustrated, is designed for the mounting of seven small individual dies, one large die or other combinations of dies. To facilitate such mounting, there is provided a plurality of chambers 7 extending 25 completely thru the chamber 4, the upper wall 1, and the lower wall 2. These chambers 7 have wall portions 8 so that there is no communication between chamber 4, and the interior of the chambers 7. Connecting with these chambers 7 30 are a plurality of passages 9, these passages, in turn, communicating with a tube or pipe 10, passing outside of the structure, itself.

The lower surface 2, is accurately machined and finished as well as the upper surfaces of the 35 dies 11, to be mounted thereon. To facilitate ready assembly and removal of these dies 11, there is provided a bolt 12, with a threaded portion 13, adapted to fit into the central threaded portion of the die 11, said bolt having a head 40 14. Interposed between the head 14 and top wall 1, is a gasket 15, a solid washer 16, and a spring washer 17. When the die 11 is first placed in position, the bolt 12 is screwed into the threaded part of the die at 13 and very lightly 45 tightened. The die is then brought into co-operative relationship with its mating die or dies, and the bolt 13 having been only lightly tightened, enables the die 11 to move relative to surface 2, into its proper position. When the die 50 11, has taken its proper position, bolt 12 is securely tightened by turning the head 14 and the spring washer 17 is compressed so that the die 11 will be held tightly against, and in firm contact, with the lower finished surface 2, effecting 55

efficient and rapid heat transfer from this surface to the die 11. If desired, a thin soft heat conducting sheet can be introduced between die 11, and the surface 2, to effect an even more perfect heat conductivity contact between these parts.

In order that the vapor introduced through pipe and hose 5, may have ample surface contact for heat transfer purposes, a plurality of rib sections 18, are located within the chamber 4, these ribs 18 in addition, forming structural connections between the hollow sections inclosed by wall 8, the outer wall 3 and the bottom wall 2. This rib structure stiffens and reinforces the lower wall 2 insuring that the finished surface on the bottom at wall 2 stays flat and smooth. In the structure shown in Fig. 1 these ribs are made a part of the lower inclosing wall 2, to add to the available surface in contact with the heated vapor and conducting the heat from this vapor to the lower wall 2, and from thence to the dies 11.

To insure that there be no accumulation of condensed heating vapor at or near the inner surface of wall 2 or any portion of chamber 4, openings 21 are provided in the ribs 18, so that complete drainage of any condensed vapor is possible back through pipe and hose 5. Such openings are necessary only in case of the structure shown in Fig. 1 as in Fig. 2, the portion of the die mounting mechanism 2 is at the top, and there is no possibility of accumulation of condensed vapor on the inner surface of wall 2.

On the structure shown in Fig. 2, these ribs indicated at 18—a are located at the top of chamber 4 and are integral with wall 2 in contact with dies 11—a, which dies cooperate with the dies 11 of Fig. 1. The reason for having the ribs 18 at the top of structure of Fig. 2 is the same as in the case of Fig. 1, to reinforce wall 2, and to insure a rapid conduction of heat from the vapor through wall 2 to the dies 11—a. The mounting of dies 11—a on the structure shown in Fig. 2 is the same as that already described in connection with the dies 11 of Fig. 1.

It has already been described that a chamber 7 is provided around and about bolt 12, which chamber communicates through passages 9, with a pipe connection 10, to the outside of the structure. The lower end of the chamber 7 is slightly enlarged as indicated at 19, to facilitate communication with openings 20 in the die 11. These openings 20, communicate by means of slots, perforations, holes or other openings, with that portion of the die 11 in contact with the pulp article to be dried. As heat is applied to this article both through die 11 and die 11—a, the water of evaporation is drawn off through openings 20, up through passage 7, across through 9 and out through pipe 10. The object of having these passages entirely within, and inclosed by the die mounting structure in contact with the heated vapor in chamber 4 within this structure, is to prevent any possibility of the water vapor evaporated from the pulp article, from condensing before it has been drawn completely and entirely away from the die 11. Otherwise, this moisture may condense and run back into the die, injuring the article under treatment.

The object of having the chamber 7 located about the bolt 12 is both to simplify the structure, and also to insure that the openings to the die 11, be available for inspection when the die is removed, and further, that the turning and removal of the bolt 12 automatically insures that

the passage 7 be clear each time the die 11 is changed.

The water vapor from the die 11 drawn through holes 20 in the die, is taken directly away from the die and its heating and contacting wall 2, so that any additional heat which this water vapor may require to prevent condensation is not taken from the wall 2, which would tend to detract from the heat available for the die 11. Rather, any necessary additional heat required by the water vapor, would be drawn from the outer wall 1, which has ample heat available to heat the vapor passing through the passages therein.

It has already been stated that while seven dies are shown in the figure illustrating this device, that a single die or some other combination of dies, between one and seven, can readily be utilized.

In case a large single article is to be made requiring a single die this would be provided with seven tapped holes corresponding in location to the location of the passage 7. Air connection in the die would also be placed adjacent to these tapped holes, and the bolts 12, will be utilized to hold this single die in place.

While I have illustrated and selected seven openings or seven die mounting positions, this is simply for the purpose of illustration, and I do not limit my structure or invention in this particular or to any other combination. However, considering the structure as shown, it is obvious that other combinations of dies may be readily mounted on this structure. For instance, three dies might be mounted on this structure, by using two adjacent bolts for each die and possibly sealing the center opening with a bolt, and washer on each end. Similarly two dies might be mounted by using three adjacent bolts together with a common center bolt or with the center bolt omitted.

It will thus be seen that I have provided a simple die mounting mechanism adapted for the mounting of individual dies or unit dies in any combination, providing within the die mounting mechanism, all heating means and all vapor extraction means. This construction permits the dies, themselves, to be made of the simplest and least expensive design effecting considerable savings in original cost and even greater savings in operating utility.

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

1. A die heating device comprising a hollow casing providing a heat retaining chamber, a plurality of tubes extending through said chamber, means for sealing one end of each tube on one face of the casing and holding the die to the opposite face thereof, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

2. A die heating device comprising a hollow casing providing a heat retaining chamber, a die mounted on one face of said casing, means for supplying a heating fluid to said chamber, a plurality of tubes extending through said chamber, and means sealing the tube openings on one side of said casing and securing the die to the other side thereof, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

3. A die heating device comprising a hollow casing providing a heat retaining chamber, a die mounted on one face of said casing, means for supplying a heating fluid to said chamber, a plurality of tubes extending through said chamber, and bolts extending through said tubes, the heads of the bolts sealing the opening of said tubes on one face of the casing, and the other end of the bolt securing the die to the opposite face of the casing, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

4. A die heating device comprising a hollow casing providing a heat retaining chamber, a die mounted on one face of said casing, means for supplying a heating fluid to said chamber, a plurality of tubes extending through said chamber, and bolts extending through said tubes threaded into said die and securing same to one face of the casing, and means at the opposite ends of said bolts sealing the opening of the tubes on the other face of the casing, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

5. A die heating device comprising a hollow casing providing a heat retaining chamber, a die mounted on one face of said casing, means for supplying a heating fluid to said chamber, a plurality of tubes extending through said chamber, bolts extending through said tubes threaded into said die and securing same to the face of the casing, and a sealing and spring washer at the opposite end of said bolts for sealing the opening of the tubes on the other face of the casing.

6. A die heating device comprising a hollow casing providing a heat retaining chamber, a plurality of tubes extending through said chamber, means for sealing one end of said tubes on one face of the casing and holding the die to the opposite face thereof, heat collecting ribs within said chamber provided with openings for condensate removal, means for supplying a heating fluid to said chamber, and venting means to permit escape of entrained air.

7. A die heating device comprising a hollow casing providing a heat retaining chamber, a plurality of tubes extending through said chamber, means for sealing one end of said tubes on one face of the casing and holding the die to the opposite face thereof, tubes communicating with said first mentioned tubes providing a chan-

nel for escape of vapor from the die to the outside of the casing.

8. A die heating device comprising a hollow casing providing a heat retaining chamber, a plurality of tubes extending through said chamber, means for sealing one end of said tubes on one face of the casing and holding the die to the opposite face thereof, said die being provided with slots communicating with one end of the tube through which water of evaporation is drawn off from the article being treated in the die.

9. A die heating device comprising a hollow casing providing a heat retaining chamber, a plurality of tubes extending through said chamber, means for sealing one end of said tubes on one face of the casing and holding the die to the opposite face thereof, said die being provided with slots communicating with one end of the tube through which water of evaporation is drawn off from the article being treated in the die, and tubes communicating with said first mentioned tubes providing a channel for escape of vapor from the die to the outside of the casing.

10. A die heating device comprising a hollow casing providing a heat retaining chamber, means to supply a heating medium to said chamber, a plurality of tubes extending through said chamber, said tubes being constructed, arranged and located to be heated by the heating medium, means for sealing one end of said tubes on one face of the casing, means for holding a die to the opposite face thereof, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

11. A die heating device comprising a hollow casing providing a heat retaining chamber, means to supply a heating medium to said chamber, a plurality of tubes extending through said chamber, said tubes being constructed, arranged and located to be heated by the heating medium, a plurality of ribs and baffles extending from said tubes and from the walls of said casing into contact with the heating medium whereby to facilitate heat exchange from the heating medium to the device, means for sealing one end of each tube on one face of the casing, means for holding a die to the opposite face thereof, and means establishing communication between the interior of said tubes and the exterior of the hollow casing whereby water of evaporation may be drawn off from the die.

MERLE P. CHAPLIN. 55