Aug. 20, 1929. G. J. MANSON 1,725,465

METHOD OF AND APPARATUS FOR DRYING PULP ARTICLES

Filed Dec. 8, 1927

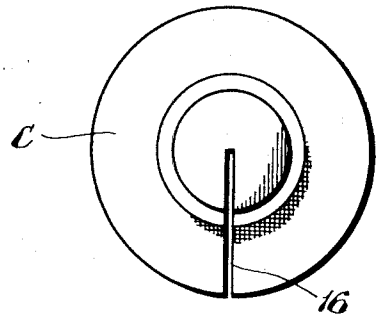


FIG. 3.

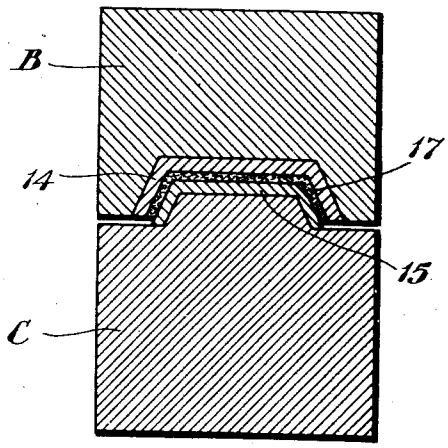


FIG. 2.

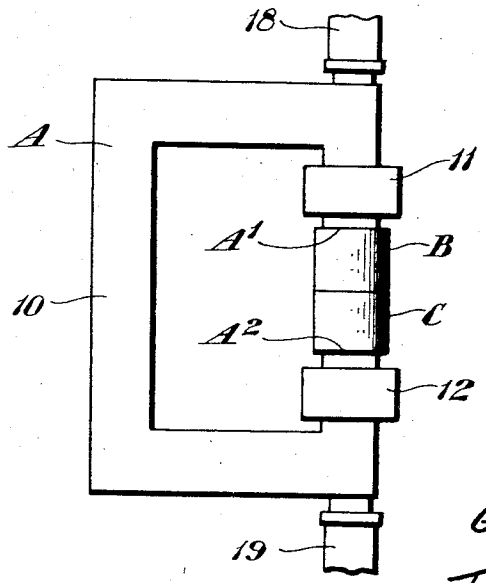


FIG. 1.

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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR DRYING PULP ARTICLES.

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This invention relates to an improved method of and apparatus for drying pulp articles, and the objects of the invention are to rapidly and economically dry pulp articles without distorting the same, or spoiling the surface thereof; and it consists essentially of drying articles through the heat produced by electrical currents induced in the portion of the die adjacent to the article, all as hereinafter more fully set forth and described in the accompanying specification and drawings.

At present articles made from pulp fibres are taken from the forming machines and are dried by subjecting the article to hot air in a closed chamber, or by carrying the article on a moving belt through a chamber containing hot air. These chambers may have steam coils in them, to heat the drying air or air which has been heated outside of the chamber may be continuously circulated through the chamber. When a pulp article is dried by these methods, it is likely to come from the drier a little distorted and with a rather rough surface.

Attempts to dry pulp articles in dies heated by resistance coils directly connected to a source of electrical energy have been tried, but it has been impossible due to the small size of the dies, to get enough energy into them to be able to operate the dies continuously and make the process commercially feasible.

I have found that if the dies containing the article to be dried are placed in a strong magnetic field which will induce a current in the part of the die next to the pulp article, the pulp article will be dried very rapidly on account of the high temperature to which the adjacent part of the die is raised by the heavy induced current.

Practically any shaped article can be more rapidly and economically dried by this method than by hot air. The finish of the article is much better and there is no distortion of the shape of the article.

In the drawings,

Figure 1 is an elevation of one form of apparatus in which the invention may be carried out.

Figure 2 is a sectional elevation through the device with the pulp article therein.

Figure 3 is a plan view of one of the dies.

Referring to the drawings, A indicates a type of transformer which may be used to develop the necessary magnetic field, having a core 10 and primary windings 11 and 12, through which the primary alternating current is passed, of suitable voltage and amperage to produce the induced current hereinafter referred to.

It will be understood that the form of transformer is shown by way of illustration only, and may be varied to suit the conditions, and that any other well known type of transformer may be used.

Figure 2 shows a section through the drying dies, of which B is the upper and C the lower die, preferably formed of wrought iron or mild steel, and faced on the surface adjacent to the pulp article with metal of high conductivity such as sheet copper, the facing of sheet copper being indicated at 14 and 15.

It is desirable to guard against the formation of eddy currents in the dies B and C, and this may conveniently be done by slotting the dies as shown by radial slots 16 in the dies for this purpose. The copper linings 14 and 15 are not slotted, as it is desirable that as heavy a current as possible should flow through them.

The pulp article 17 is located between the faces 14 and 15 and may be either formed therein by pressure between the dies exerted in suitable hydraulic press or may be placed in the dies after being transversely formed in another press.

When it is desired to dry the article, the dies B and C containing the same, are placed between pole faces A^1 and A^2 of the transformer A, and the coils 11 and 12 are excited by alternating current passed therethrough, the magnetic force produced from this current flowing between the faces A^1 and A^2 through the dies B and C, and causing a heavy current to be induced in the copper plates 14 and 15, causes these plates to rapidly increase in temperature, giving up heat to the pulp article 17, thereby evaporating the water in the pulp articles, which will escape between the dies B and C.

In some circumstances, it may be desirable to apply pressure to the dies just before the pulp article is completely dried in order to improve the surface of the same. This may be done by exerting pressure on the pole faces of the transformer as through hydraulic pistons and cylinders 18 and 19, arranged to force the pole faces of the transformer together, the elasticity of the metal core being sufficient to permit the relatively

small movement required. These hydraulic pistons and cylinders may be regulated and controlled in any way known in the art.

The time of drying and intensity of current will be regulated according to the thickness and shape of the article to be dried.

It will of course be understood that various other methods may replace copper as the lining of the die, but it is desirable that such metal should have a high degree of conductivity.

As many changes could be made in the above construction, and many apparently widely different embodiments of my invention, within the scope of the claims, constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:

1. The herein described method of drying pulp articles, comprising placing the same between a pair of dies and inducing heavy secondary electrical current in the dies and expelling the moisture therefrom.

2. The herein described method of drying pulp articles, which comprises placing the same between dies, heating surfaces of increased electrical conductivity and inducing heavy secondary electrical heating currents in the surfaces.

3. The herein described method of drying pulp articles, which comprises placing the article between a pair of dies, inducing heavy secondary electrical heating current in the dies, then exerting a pressure between the dies.

4. An apparatus for the purpose specified, comprising a pair of dies having copper faces adjacent to the article to be dried, and means for inducing electrical currents in the said faces.

5. The herein described method of drying a pulp article, which comprises placing the same between a pair of dies adapted to allow the evaporated water to escape therefrom, forming a complete magnetic circuit including a portion of the die surface, inducing a heavy secondary electrical current in the said magnetic circuit to thereby heat the pulp article and expel the moisture therefrom.

6. An apparatus for the purpose specified, comprising a pair of dies adapted to permit the escape of vapour therefrom, a magnetic circuit associated with the dies including part of the die surface, means for inducing a heavy secondary electrical current in the said magnetic circuit to heat the part in the die and expel the moisture therefrom out of the die.

7. In an apparatus of the character described, a pair of dies, having means adapted to guard against the formation of eddy currents therein, and adapted to permit the escape of moisture therefrom, a magnetic circuit associated with the dies, and means for inducing a heavy secondary current in the said magnetic circuit to heat the article in the dies and expel the moisture therefrom.

8. An apparatus for the purpose specified comprising a transformer having opposite pole faces between which dies are adapted to fit, a primary heating coil surrounding the pole faces, a pair of dies adapted to fit between the pole faces and to have electrical currents induced therein by the said primary windings, means for exerting a pressure between the pole faces, and the dies provided with copper working surfaces.

In witness whereof I have hereunto set my hand.

GEORGE JAMES MANSON.