O. MINTON.

PROCESS OF DRYING SHEET MATERIAL.

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1,147,808. Patented July 27, 1915.

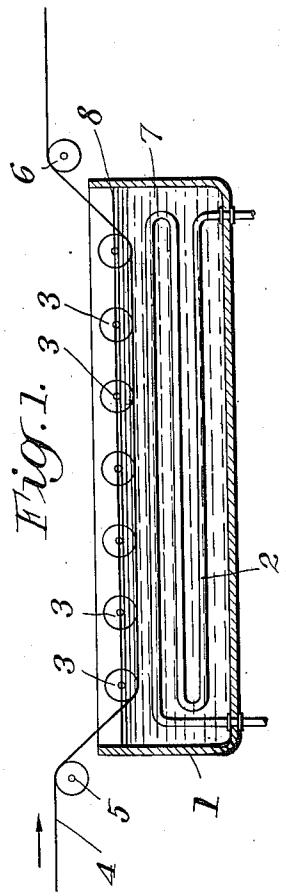


Fig. 1.

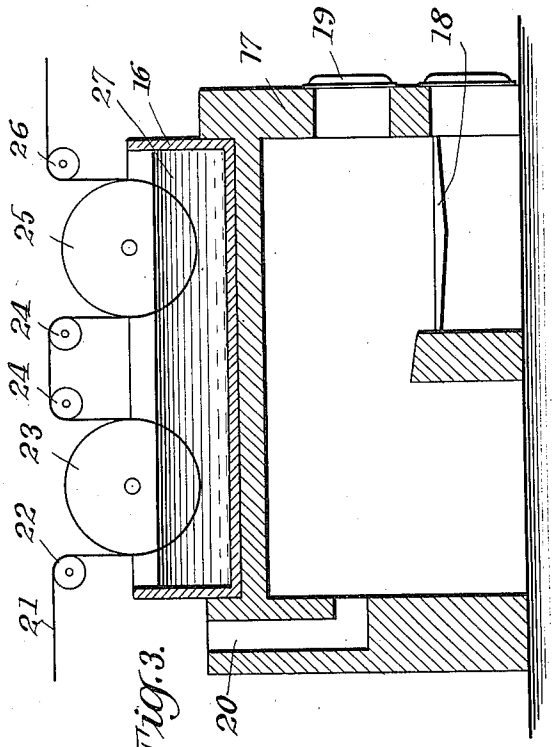


Fig. 3.

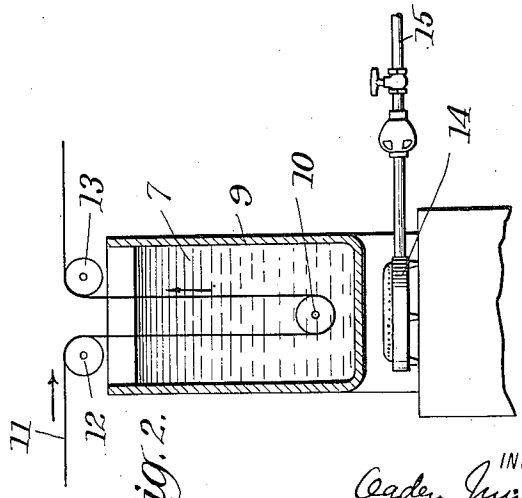


Fig. 2.

WITNESSES

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PROCESS OF DRYING SHEET MATERIAL.

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To all whom it may concern:

Be it known that I, OGDEN MINTON, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, (whose post-office address is 186 Washington Park, Brooklyn, New York,) have invented certain new and useful Improvements in Processes of Drying Sheet Material, of which the following is a specification, taken in connection with the accompanying drawing, which forms a part of the same.

My invention relates to drying sheet material and more particularly to a method of drying said material continuously.

My invention further relates more particularly to a method of drying and finishing paper, though it is equally adapted for drying any sheet material as, for example, cotton or other fabric which may be moistened in bleaching or dye vats.

It is particularly adapted for use in the art of paper making, wherein the sheet or web of wet paper after being treated by my improved method, can be immediately wound into rolls of finished paper whether or not the web or sheet comes directly from the wet end of the paper machine or from a sizing vat.

In the present state of the art it is customary to take the paper from the wet end of the paper machine and after passing it through squeeze rollers, to get out as much moisture as possible, pass it around or over one or more steam drums, frequently as many as thirty such drums being used, to dry it. After the paper has been thus dried it usually, in the manufacture of high grade paper, continues through a vat of animal size and is then cut into sheets and stacked. A number of these sheets, usually about 20, are placed upon poles and taken to drying lofts which are heated to about 120° F. where the paper is allowed to dry slowly usually taking about forty-eight hours. Moreover in high grade paper, great care has to be exercised not to overheat it which would injure its quality.

By my improved method I greatly reduce the time necessary to finish the paper, and avoid the cutting and hanging of the paper, and the delay of forty-eight hours in the drying lofts, besides the necessary handling and liability to damage in taking it to and from these drying lofts. Moreover by my improved method the paper is completely finished so that it can be immediately wound into rolls of finished paper.

I have shown in the drawings by way of illustration several forms of apparatus whereby my method may be carried out, but of course it is to be understood that my method is not to be confined to any particular form of apparatus.

In the accompanying drawing I have shown by way of example three forms of apparatus.

Figure 1 is a vertical section through one form of drying vat; Fig. 2 is a vertical section through another form of drying vat, and showing another manner of heating it; Fig. 3 is a vertical section through still another form of drying vat illustrating another form of heater.

In the drawing 1, Fig. 1, is a vat having a steam coil 2 and is preferably provided with one or more submerging rollers 3, 3. In this vat 1 I place a suitable medium which will have no deleterious effect upon the web of sheet paper 4 which is fed from the wet end of the paper machine (not shown) over the guide roll 5 and into the vat 1 beneath the submerging rollers 3, 3, and out at the other end of the vat over the guide roll 6 to be immediately rolled into rolls of finished paper; or, to pass through a sizing vat, in which case, it would be again dried in the same manner as shown in Fig. 1 and then immediately rolled into rolls of finished paper. In the first case, where no size is used, there would simply be one drying vat. In the second case where the paper is sized there would be two such drying vats, the second one operating upon the web of paper after it emerges from the sizing vat. It is therefore clear that my invention relates either to the web or sheet of wet paper coming immedi-

ately from the wet end of the paper machine or from the sizing vat. When I refer to a sheet of paper coming from the paper machine I mean either a sheet which has come directly from the wet end of the paper machine without being sized, or one which has been dried and then subsequently sized usually with animal size. The medium which I have found has no deleterious effect upon the web or sheet of paper and which will permit the paper being dried while in the vat is mercury 7, the level of which is preferably at 8. It is to be understood of course that while I preferably use mercury that any other suitable medium which will accomplish the same result comes within the terms of my invention. This mercury is heated to the necessary temperature by steam passing through the steam coils 2, the temperature being sufficient to drive off all moisture in the web or sheet of paper 4, while it is within the mercury, the moisture bubbling up as steam and passing into the atmosphere.

In Fig. 2, I have shown a vat 9 in which is mounted a submerging roller 10 over which passes the web or sheet 11 after passing around guide rolls 12 and then emerging out of the mercury 7 and passing over the guide roller 13. In this form of apparatus the vat 9 is heated by a Bunsen burner 14, the gas being fed through the pipe 15.

Various other means may be used to heat the drying vat. For example the drying vat 16, Fig. 3, may be heated by a furnace 17 having a grate 18, feed door 19 and chimney 20. In this form the web or sheet 21 is fed either directly from the wet end of the paper machine, or from the sizing vat all as previously mentioned, over the guide roll 22, under the submerging roller 23, over the guide rollers 24, 24, under the submerging roller 25 and out over the guide roller 26, to be immediately rolled into rolls of finished paper, or, fed through a sizing vat in which case, the paper would pass to a second drying vat such as described. In this form the mercury 27 is brought up to the proper temperature to vaporize the moisture in the sheet or web which moisture is driven off into the atmosphere.

In all forms the paper is subjected to a smoothing, ironing or finishing effect of the mercury, which is the medium which I preferably employ.

It is clear that when my improved process is used, particularly in the manufacture of paper, that the period to make the complete product is materially shortened, and many steps now necessary are avoided, with the consequent economy in the cost of manufacture, besides obtaining a superior product.

Having thus described my invention in connection with different embodiments thereof to which my invention is not to be limited what is claimed as new and what it is desired to secure by Letters Patent is set forth in the appended claims:

1. The process of drying sheet material consisting in passing it through a liquid bath of a medium which has no deleterious effect on the sheet material, and which is heated to a temperature sufficient to evaporate the moisture in the sheet material.

2. The process of drying sheet material in a continuous web consisting in passing it continuously through a liquid bath of a medium which has no deleterious effect on the sheet material, and which is heated to a temperature sufficient to evaporate the moisture in the sheet material.

3. The process of drying sheet material consisting in passing it through a bath of mercury which is heated to a temperature sufficient to evaporate the moisture in the sheet material.

4. The process of drying sheet material consisting in passing it continuously through a bath of a non-volatile medium, of sufficient density to have an ironing effect on the sheet material while in the bath, said bath being heated to a temperature sufficient to evaporate the moisture in the sheet material.

5. In the art of paper making the process of taking the wet sheet of paper as it comes from the wet end of the paper machine or from the sizing vat and passing it through a liquid bath of a medium which has no deleterious effect on the paper, and which is heated to a temperature to evaporate the moisture in the paper yet sufficiently low not to injure the paper.

6. In the art of paper making the process of taking the wet web of paper as it comes from the wet end of the paper machine or from the sizing vat and passing it continuously through a liquid bath of a medium which has no deleterious effect on the paper, and which is heated to a temperature to evaporate the moisture in the paper yet sufficiently low not to injure the paper.

7. In the art of paper making the process of taking the wet web of paper as it comes from the wet end of the paper machine or from the sizing vat and passing it through a bath of a nonvolatile medium which has no deleterious effect on the paper, and which is heated to a temperature to evaporate the moisture in the paper yet sufficiently low not to injure the paper.

8. In the art of paper making the process of taking the wet web of paper as it comes from the wet end of the paper machine or from the sizing vat and passing it through a bath of mercury which is heated to a temperature sufficient to evaporate the moisture

in the paper but not sufficiently high to injure the paper.

9. In the art of paper making the process of taking the wet web of paper as it comes from the wet end of the paper machine or from the sizing vat and passing it continuously through a bath of mercury which is heated to a temperature sufficient to evaporate the moisture in the paper but not sufficiently high to injure the paper.

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Witnesses:
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