O. MINTON.

METHOD AND APPARATUS FOR CONTINUOUSLY COATING OR IMPREGNATING MATERIAL.

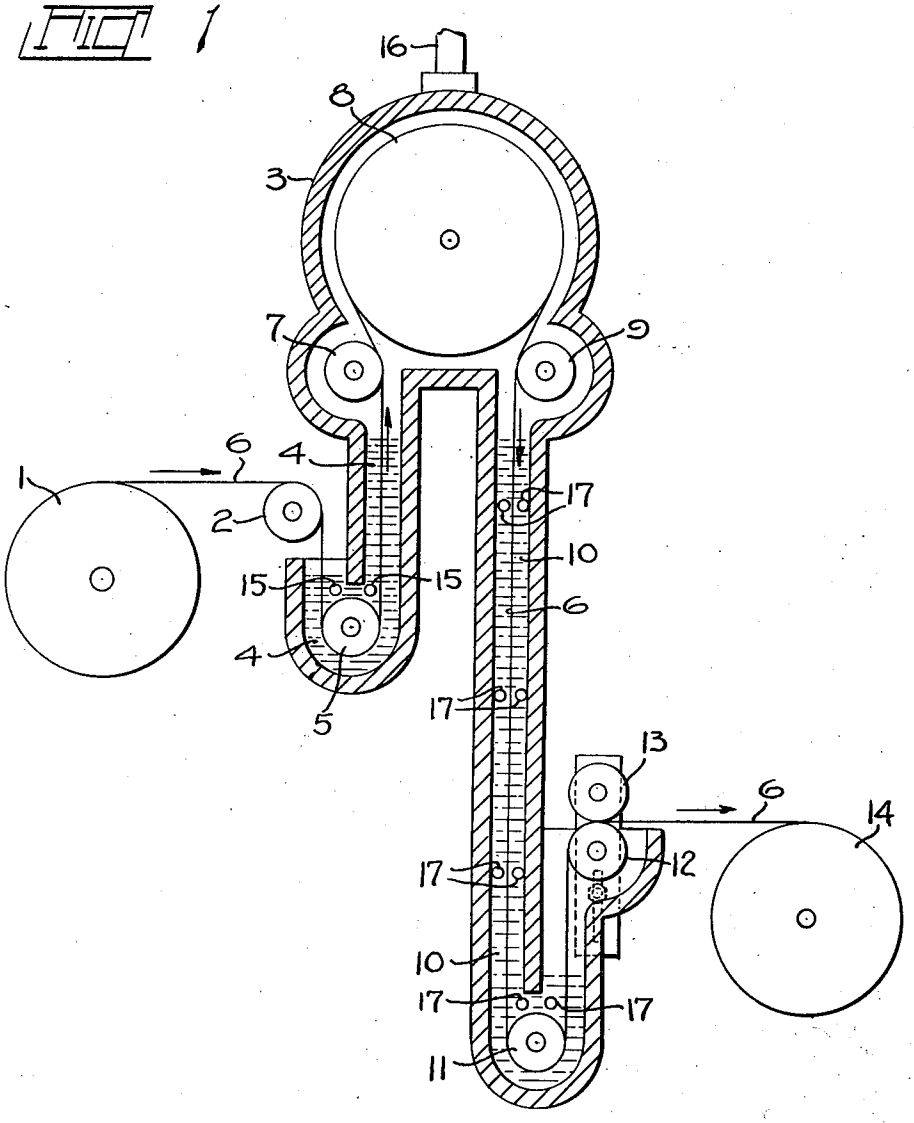
APPLICATION FILED JULY 22, 1919.

1,322,327.

Patented Nov. 18, 1919.

2 SHEETS—SHEET 1.

FIG. 1



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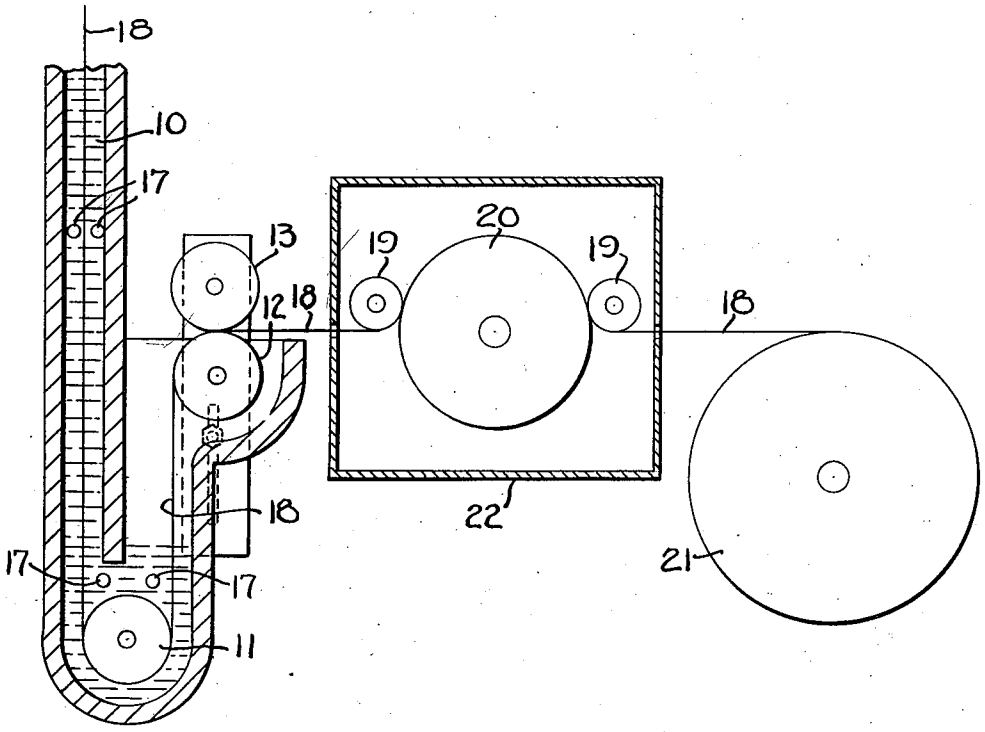
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Patented Nov. 18, 1919.

2 SHEETS—SHEET 2.

FIG 2



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METHOD AND APPARATUS FOR CONTINUOUSLY COATING OR IMPREGNATING MATERIAL.

1,322,327. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed July 22, 1919. Serial No. 312,627.

To all whom it may concern:

Be it known that I, OGDEN MINTON, a citizen of the United States, residing at Short Hills, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Methods and Apparatus for Continuously Coating or Impregnating Material, of which the following is a specification, taken in connection with the accompanying drawings.

My invention relates to a method and apparatus for continuously coating or impregnating material, and to the article so treated.

More particularly my invention relates to a method and apparatus for continuously coating or impregnating sheet material and to the sheets so treated.

My invention further relates to the method and apparatus for manufacturing economically and expeditiously water proof paper, and to paper so treated.

It further relates to the method and apparatus of manfacturing what is commonly called "roofing felt", as well as to the felt as an article of manufacture.

My invention further relates to certain steps and combinations of steps in the manufacture of these articles, also to certain elements and combinations of elements, whereby the methods or processes may be carried out, as well as the certain details of construction all of which will be more fully hereinafter described in the specification and pointed out in the claims.

I have shown in the drawings diagrammatically one form of apparatus which may be used to carry out my method but it is to be distinctly understood that my invention is not to be confined to the particular form of apparatus shown by way of illustration.

In the accompanying drawings the same reference numerals refer to similar parts in the drawing.

Figure 1 is a vertical diagrammatic section through a form of apparatus which may be used to carry out my improved process;

Fig. 2 is a fragmentary diagrammatic vertical section of another form of apparatus which I may use.

In describing my invention I will describe it as applied to treating sheet material, which is preferably, though not necessarily, paper. This paper is brought in the form of a roll or reel 1 from the paper machine (not shown) usually in a more or less wet condition. It is then fed over the guide roll 2 into the vacuum machine 3, first passing through a sealing medium 4 which has no affinity and no deleterious effect on the material to be coated or impregnated. In this sealing medium I preferably mount a guide roll 5 under which the strip, sheet or web material 6 passes, thence in contact with the guide roller 7, and then preferably, though not necessarily, over a heated drying cylinder 8, mounted within the vacuum chamber 3, thence in contact with the guide roller 9, and out through the sealing medium 10 which is the medium with which the material is to be coated or impregnated. It is to be distinctly understood that my method and apparatus are meant to either impregnate the material treated, or to coat it only, or to both impregnate and coat it, and that when I use the term "coating or impregnating", I use these terms as above explained.

The web 6 passes through this sealing medium 10 and around the guide roller 11, thence out between the guide roll 12 and the adjustable squeeze roller 13, which remove any surplus coating or impregnating material, the surplus dropping back into the bath 10. The material 6 is then preferably rolled into the finished roll 14.

The sealing bath 4 may be as previously described of any suitable material which has no affinity for the article treated, and which does not injure it. I have found in practice that a mercury seal will perform this function. This sealing bath may, in some cases, be heated by a suitable medium passing through the pipes 15—15.

I connect the vacuum chamber 3 with the pipe 16 which runs to a condenser which will maintain a suitable vacuum in the chamber 3. If the article treated is a web of paper the vacuum will be so regulated that the paper will be dried and "opened" as it passes through this chamber. The vacuum will withdraw a large portion of the air confined or occluded in the paper which air will pass off, together with the steam vapor given off by the web of paper, through the pipe 16. This cylinder 8 is preferably steam heated to insure the complete drying of the web 6 before it passes

into the coating or impregnating seal 10. The web 6 will enter this seal 10 dry with substantially all, or a large portion, of its occluded air removed dependent upon the degree of vacuum maintained in the chamber 3, so that its interstices or pores will be opened to receive the coating or impregnating material 10.

A sufficient vacuum is preferably maintained in the chamber 3 so that the web will be dried at an extremely low temperature which will insure that the strength of the fibers of the web 6 will not be lessened, nor will they be distorted or warped as would be the case if the web 6 were dried at a high temperature.

Assuming, for example, that a vacuum of 28 inches is maintained in the chamber 3, the boiling point of the water in the web 6 would then be about 100° F. This drying cylinder 8 would be supplied with steam at a pressure say of 35.3 lbs. gage pressure, and be at a temperature of about 281° F. This gives a difference of 181° F. which difference, if the paper were dried in atmospheric pressure, would only be 281° minus 212° or 69° F. These figures are only given as an example of what my apparatus will do and the amount of drying and the speed with which it can be done. At this low temperature of about 100° F. the texture and fiber of the paper will not be marred, distorted, warped or injured in any particular.

Of course while I have mentioned 28 inches of vacuum, and a certain temperature these may be varied without departing from my invention to obtain different degrees of impregnation or coating, and can also be varied for different articles treated.

Should the steam and vapor carried off by the pipe 16 carry with it any valuable products which may have been in the paper, or the material treated, these can be readily recovered in any well known manner.

In some cases the impregnating or coating bath 10 need not be heated as the paper or web 6, or whatever the material treated may be, will be sufficiently opened up by the vacuum maintained in the chamber 3, so that it will absorb or take up sufficient of the bath 10. In other cases, with the same bath or with different baths 10, it may be desirable to heat it in any suitable manner such as by pipes 17—17. The sealing medium 10 may be of any suitable material such as is desired to coat or impregnate the material treated. In some cases this sealing medium 10, for example, may be wax, paraffin, tar, or asphaltum, or any similar material.

My invention also includes the method of treating material continuously, in the manner previously described, but coating it or impregnating it with some material which afterward needs further treatment, as for example to make it water proof.

I have shown in Fig. 2 a strip of material 18, which is preferably a web of paper which has passed through the sealing and impregnating or coating bath 10, which in this instance, is formed of some material, as for example sulfur, which has to be heated to render it water proof by giving it a glaze. The sulfur or other suitable material is preferably in a liquid state, either melted, or in solution.

In this Fig. 2 after the web 18 has passed the rolls 12 and 13 to remove the surplus sulfur or similar material, it passes into the chamber 22 under the guide rolls 19—19 and over the heated roller 20, which is heated to a temperature sufficient to glaze the sulfur, and is then wound into the finished roll 21.

If other coating or impregnating material is used which requires a chemical change to render it water proof, the web will be given the required treatment after it leaves the rollers 12 and 13 and preferably prior to being rolled into the finished roll 21.

It will be noted that my method is continuous. It can be operated day and night, and from month to month by simply stopping the travel of the web when the roll 1 is nearly exhausted and splicing on a new roll. This avoids breaking the vacuum in the machine, and the labor of rethreading the machine. All that is necessary is to replenish from time to time the bath 10 and, also occasionally, to add to the bath 4 should that be necessary, it of course being understood that the quantity of the bath 4 will remain for all practical purposes constant, whereas the bath 10 will be continuously diminished by portions of it being taken up by the sheet or web 6.

It will be further noted that the vacuum in my vacuum machine does not have to be broken for the insertion of different rolls 1, with the consequent delay and expense of exhausting the vacuum chamber each time that a new roll is inserted, besides the labor of clamping on doors or covers that may be necessary to close the chamber after the insertion of each new reel or roll.

By my invention the time necessary to coat or impregnate a roll of sheet material is greatly reduced, and the resulting product is better and more uniform being uniformly coated or impregnated, or both, to the exact degree required for any particular product, by regulating the vacuum, the temperature of the drying cylinder 8, the speed of the web 6 through the machine, and heating, or not, the sealing bath 10 as may be deemed necessary for the particular product being manufactured, and regulating the pressure of the squeeze roll 13.

My invention is particularly advanta-

geous in the manufacture of roofing paper or "roofing felt." If such roofing paper or felt is not uniformly coated and impregnated with the water proofing material, as for example, tar or asphaltum, it will, when exposed to the weather develop defects, permitting passage of water in some places whereas other portions of the same sheet would be water proof. If the felt were used for roofing it would soon permit leaks to develop.

By having my drying cylinder 8 inside the vacuum chamber 3, I accomplish not only the functions previously described but the vacuum chamber 3 practically acts on the principle of a thermos bottle preventing the radiation of heat, which would raise the temperature of the room in which the apparatus is located and render it oppressive for the workmen, besides requiring a greater quantity of steam to maintain the cylinder 8 at the particular temperature desired.

Having thus described this invention in connection with illustrative embodiments thereof, to the details of which I do not desire to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

What I claim is:—

1. The process of drying, coating or impregnating material consisting in passing it through a liquid bath for which it has no affinity, said bath being a protective seal for maintaining a vacuum, subjecting the material to a partial vacuum, and then immediately subjecting it to the coating or impregnating material without first exposing it to the air.

2. The process of drying, coating or impregnating material consisting in continuously passing it through a liquid bath for which it has no affinity, said bath being a protective seal for maintaining a vacuum, subjecting the material to a partial vacuum, and then immediately and continuously subjecting it to the coating or impregnating material without first exposing it to the air.

3. The process of drying, coating or impregnating material consisting in passing it through a liquid bath for which it has no affinity, said bath being a protective seal for maintaining a vacuum, subjecting the material to heat and a partial vacuum, and then immediately subjecting it to the coating or impregnating material without first exposing it to the air.

4. The process of drying, coating or impregnating sheet material consisting in passing it through a liquid bath which has no deleterious effect on the sheet material, said bath being a protective seal for maintaining a vacuum, subjecting the sheet to a partial vacuum to open up the sheet material, and then immediately subjecting the sheet material to the coating or impregnating material without first exposing it to the air.

5. The process of drying, coating or impregnating sheet material consisting in passing it through a liquid bath which has no deleterious effect on the sheet material, said bath being a protective seal for maintaining a vacuum, subjecting the sheet to heat and partial vacuum to open up the sheet material, and draw off substantially all of its moisture and then immediately subjecting the sheet material to the coating or impregnating material without first exposing it to the air.

6. The process of continuously drying, coating or impregnating sheet material consisting in passing it continuously through a liquid bath which has no deleterious effect on the sheet material, said bath being a protective seal for maintaining a vacuum, continuously subjecting the sheet to a partial vacuum to open up the sheet material, remove substantially all of its moisture and a large portion of its occluded air, and then immediately and continuously subjecting the sheet material to the coating or impregnating material without first exposing it to the air.

7. The process of continuously drying, coating or impregnating paper consisting in passing it continuously through a liquid bath which has no deleterious effect on the paper, said bath being a protective seal for maintaining a vacuum, continuously subjecting the paper to a partial vacuum to open up the paper, remove substantially all of its moisture and a large portion of its occluded air, and then immediately and continuously subjecting the paper to the coating or impregnating material without first exposing it to the air.

8. The process of continuously drying, coating or impregnating sheet material consisting in passing it continuously through a liquid bath which has no deleterious effect on the sheet material, said bath being a protective seal for maintaining a vacuum, continuously subjecting the sheet to heat and a partial vacuum to open up the sheet material, remove substantially all of its moisture and a large portion of its occluded air, and then immediately and continuously subjecting the sheet material to the coating or impregnating material without first exposing it to the air.

9. The process of continuously drying, coating or impregnating roofing paper, known as "felt", consisting in passing the uncoated felt continuously through a liquid bath which has no deleterious effect upon it, said bath being a protective seal for maintaining a vacuum, continuously subjecting the felt to a partial vacuum to open up its fibers, remove substantially all of its moisture and a large percentage of its occluded

air, and then immediately and continuously subjecting it to the impregnating material without first exposing it to the air.

10. The process of continuously drying, coating or impregnating roofing paper known as "felt" consisting in passing the uncoated felt continuously through a liquid bath which has no deleterious effect upon it, said bath being a protective seal for maintaining a vacuum, continuously subjecting the felt to heat and a partial vacuum to open up its fibers, remove substantially all of its moisture and a large percentage of its occluded air, and then immediately and continuously subjecting it to the impregnating material without first exposing it to the air.

11. The process of continuously drying, coating or impregnating roofing paper known as "felt" consisting in passing the uncoated felt continuously through a liquid bath which has no deleterious effect upon it, said bath being a protective seal for maintaining a vacuum, continuously subjecting the felt to a partial vacuum to open up its fibers, remove substantially all of its moisture and a large percentage of its occluded air, and then immediately and continuously subjecting it to an impregnating bath of tar or asphaltum without first exposing it to the air.

12. The process of drying, coating or impregnating material consisting in passing it through a liquid bath for which it has no affinity, subjecting it to a partial vacuum, then immediately subjecting it to a coating or impregnating material which needs the application of heat to make it water proof, and then subjecting said material to heat to make the impregnating material water proof.

13. The process of drying, coating or impregnating material consisting in passing it through a liquid bath for which it has no affinity, subjecting it to a partial vacuum, then immediately subjecting it to a coating or impregnating material which needs the application of heat to make it water proof, and then subjecting said material to heat to give said material a glazed surface.

14. The process of drying, coating or impregnating sheet material consisting in passing it through a liquid bath for which it has no affinity, subjecting it to a partial vacuum, then immediately subjecting it to a coating or impregnating material which needs the application of heat to make it water proof, and then subjecting said material to heat to make the impregnating material water proof.

15. The process of drying, coating, or impregnating material consisting in passing it through a liquid bath for which it has no affinity, subjecting it to a partial vacuum, then immediately subjecting it to a coating of sulfur, then subjecting the material with its coating of sulfur to heat to glaze it, and render it water proof.

16. An apparatus for drying and coating or impregnating material having a vacuum chamber and two liquid seals through which the material treated passes, one of the liquid seals being formed of a liquid which has no affinity for the material treated, and the other liquid seal being formed of the coating or impregnating material.

17. An apparatus for drying and coating or impregnating sheet material having a vacuum chamber and two liquid seals through which the sheet material passes, one of the liquid seals being formed of a liquid which has no affinity for the sheet material, and the other liquid seal being formed of the coating or impregnating material.

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Witnesses:
ALAN M. JOHNSON,
JOHN D. MORGAN.