UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR WAXING PAPER.

1,385,042.


To all whom it may concern:

Be it known that we, JOHN DECKER, a citizen of the United States, and ADOLPH C. VAN SLYES, a subject, and the Queen of Holland, both residents of Nashua, in the county of Hillsborough and State of New Hampshire, have invented an Improvement in Methods of and Apparatus for Waxing Paper, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to methods of and apparatus for treating paper with paraffin. 15

One object being to secure a smooth even finish while performing the coating operation at relatively high rates of speed and under conditions capable of producing a large output.

The invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevation in partial section showing an apparatus embodying one of the inventions and capable of carrying out one form of the method;

Fig. 2 is an enlarged detail showing a portion of one of the suction pipes;

Fig. 3 is a cross sectional view taken through one of the suction pipes;

Fig. 4 is a side elevation of the support for the suction pipes and their connections to the exhaust device; and

Fig. 5 is a front elevation of the same.

Referring to the drawings and to the illustrated embodiment of the invention there selected for illustration, the machine therein shown for coating paper is of the general type disclosed in prior patent to Carter No. 1,140,873. This comprises a frame work 3, at one end of which there are provided sets of bearings 5, 7 and 9, for the shaft of a supply roll of paper 11, any one of which sets of bearings may be employed as desired. At the opposite end of the machine the paper is reeled up on a power driven winding reel (not herein shown), the paper, which is here designated as P, being wound up on the reel and unwound from the supply roll 11 at a relatively high rate of speed and being subjected to the intermediate steps of waxing and finishing.

On leaving the supply roll the paper, before being subjected to the heated wax, preferably passes over a system of guiding and tensioning rolls, which are herein shown as embodied in the companion guide rolls 13 and 15, journaled on the frame work of the machine and the succeeding guide roll 17. Thence the paper passes into the wax pan 19 which is supplied with paraffin kept heated by any suitable means such as a steam jacket, the paper being caused to pass through the melted paraffin at a depth which is determined by the adjustable guide roll 21. The latter is supported at opposite sides of the machine upon vertical, adjustable guides 23, each capable of vertical adjustment through adjusting screws and a system of beveled gears 25 controlled by the hand wheel 27, so that the depth of immersion and the length of paper immersed may be adjustably controlled.

As the paper passes through the melted paraffin it becomes saturated therewith and then passes upward over the guide roll 29 and thence between the squeegee rolls 31 and 33, which latter act to press out and remove the surplus melted wax. These squeegee rolls may be of any suitable construction, such as that shown in the aforesaid prior patent No. 1,140,873, provided with any suitable surface or jacket-covering and being preferably hollow and steam heated. The upper roll is carried in bearings 35 vertically adjustable by means of the feed screw 37 and hand wheel 39 so that the pressure between the rolls may be varied.

The paper having had the surplus wax removed next passes to the polishing rolls 41, 43 and 45, these rolls being also preferably heated, as by providing for the admission of steam to or through them in any suitable manner, and presenting a smooth heated polishing surface to the paper. Preferably, though not necessarily, the roll 41 is of steel and rolls 43 and 45 of brass. All rolls being positively driven and the rolls 41, 43 and 45 being driven in the opposite direction to the travel of the paper. The rolls 43 and 45 are also carried in adjustable bearings so that the pressure thereof against the paper web may be varied. The heated
polishing rolls 43 and 45 pressing against the rapidly moving paper and being driven in the opposite direction to the travel thereof impart a smooth, even, glossy finish to the wax.

In order to preserve the finish imparted by the polishing rolls, the wax should be set and hardened as quickly as possible after leaving the burnishing rolls. In the illustrated form of the invention, the paper web on leaving the lower burnishing roll 45 is plunged into a water bath contained within the water tank 47, the paper being guided in its travel through the tank by the power driven submerged rolls 49 and 51. Any suitable means are provided for driving the rolls 49-51 at the required rate of speed as well as for guiding and maintaining the guide rolls, but the details of the driving mechanism form no essential part of the present invention. A supply of cold water is maintained in the tank by any desired means and the paper web may be given any required path of travel through the tank by an appropriate arrangement of the guide rolls therein.

When the paper leaves the tank it is provided with a hardened finished wax coating, but before being wound up on the winding reel, the surplus wax must be removed, and this should be done as quickly as possible after leaving the bath. In the illustrated embodiment of the invention, the water, instead of being blown away from the surface of the paper by the force of an air blast, is removed more effectively by one or more suction pipes, represented at 53 and 55 in Fig. 1, bearing against opposite faces of the paper web. As herein shown, each suction pipe comprises a horizontally arranged fixed section suitably supported in fixed relation to the machine (the details of the support not being shown in Fig. 1) and bearing against the face of the paper web, the contacting walls of the pipe being preferably smooth or polished. One or both ends of the pipe section is connected with a suction pipe 57 extending to suitable air-exhaustion apparatus adapted to maintain a suction and carry away and dispose of the surplus moisture which is drawn into the pipe. Each pipe is provided with suitably shaped suction orifices, which are herein shown as consisting of three rows of small spaced orifices 59, 61 and 63, the row 61 approximating the line of contact with the paper, the row 59 being just below the point of contact and the row 63 just above. Each pipe section may be and preferably is so adjusted with relation to the paper web that it presses slightly against it and tends to deflect it somewhat from a straight path of travel. As the paper passes rapidly over the surface of the suction pipe (see Fig. 3) the surplus moisture is carried with it between the converging walls of the pipe and the paper and the pipe tends to remove this moisture by a mechanical wiping action, the water thus delivered to the pipe being withdrawn through the lower row of suction openings or dropping from the pipe back into the tank. Any surplus water which passes the lower row of openings tends to be removed through the suction orifices of the upper rows 61 and 63. Water on the opposite side of the paper web is similarly removed by the action of the suction pipe bearing against the opposite side thereof.

By utilizing the described form of suction device for removing surplus moisture from the paper, it is found that relatively high rates of speed may be maintained while assisted by the provision of a paper passing to the reel, thereby materially increasing the output of the machine. This we attribute to the fact that the effective removal of moisture appears to be due to the combined suction action maintained within the pipes and the mechanical wiping action of the pipe itself, the effect of the latter increasing with an increase in speed.

The same suction pipes may be made available for different widths of paper by use of an imperforate sleeve 65 at each end of the pipe. This sleeve is adjustable by means of the set screw 67 to different positions on the pipe so that the suction orifices extending beyond the outside limits of the paper may be closed by the sleeve.

If desired, additional mechanical devices may be used for removing the excess moisture before the paper reaches the suction device, and we have herein shown for that purpose in Fig. 1 the mechanical wiping devices 60 and 71, which engage opposite sides of the paper web and tend to remove the excess water from the paper which is carried up from the tank. These wiping devices may consist of fixed, straight edged, smooth faced strips extending transversely across the paper web and in contact therewith, being preferably located and positioned so as to have somewhat an acute angle with relation to the approaching paper.

The effectiveness of the water removal and increased speed of production may also be assisted by the provision of agitation of the paper as it leaves the tank, as by vibrating or shaking the same. To this end we have shown (diagrammatically in Fig. 1) applied to opposite sides of the paper and immediately below the wipers 69 and 71 vibrating devices 73 and 75 consisting of smooth transverse rods bearing against the face of the paper and controlled by electric vibrating motors 77 and 79, energized through an electric circuit 81, which are adapted to impart to the vibrator rods 73 and 75 a vibration of low amplitude but high periodicity. The effect of these vi-
brating devices is to agitate the paper as it leaves the tank, assisting in freeing from it moisture tending to cling to it but without any tendency to damage or injure the finish 
5 of the paper.

One method of supporting and connecting the suction pipes is illustrated in Figs. 4 and 5, where the mechanical wipers 69 and 71 and the vibrating devices 75 and 75 are 10 omitted, but an additional pair of suction pipes 81 and 83 are utilized to render more effective the removal of the water. In the illustrated form of the invention each suction pipe has its opposite ends connected to a suction box or separator 85, the pipe communicating with the interior thereof, one suction box only being shown in Figs. 4 and 5. The suction pipe is rigidly fixed to the support 87 fastened to the ceiling or an overhead part of the machine frame. The upper end of the suction box is connected to the suction pipe 57 which in turn is connected to the exhaust fan 89 driven from any suitable source of power, but serving to create a suction within, the suction box and each of the pipes communicating therewith. The lower end of the suction box is drained by the drain pipe 91 which carries the water drained from the paper back into the tank 47.

While for purposes of illustration we have herein shown and described one specific embodiment of the invention, it is to be understood that the same is not limited to the details of construction herein shown or to the relative form or arrangement of parts or to the specific application thereof, but that extensive deviations may be made therefrom without departing from the spirit of the invention.

Claims.
1. The method of making wax paper which comprises first coating the same with heated wax, then finishing the surface, then setting the wax by subjecting it to the action of a water bath and then removing the water by suction.
2. The method of making wax paper which comprises causing the paper to travel in the direction of its length through a bath of heated wax, then through a water bath and then into mechanical contact with a suction device.
3. The method of making wax paper which comprises first coating the same with heated wax, then setting the wax by a water bath and removing the water by a combined wiping and suction action.
4. The method of making wax paper which comprises first coating the same with heated wax, then subjecting it to the action of a water bath, vibrating the paper to remove surplus water and removing additional moisture by suction.
5. The method of making wax paper which comprises causing the paper to travel the direction of its length through a bath of heated wax, then through a water bath and then in contact with a mechanical wiper to remove moisture.
6. The method of making wax paper which comprises first coating the same with heated wax and then subjecting it to a water bath, withdrawing it therefrom and removing water by suction.
7. The method of making wax paper which comprises first coating the same with heated wax, then subjecting it to the action of a water bath and then to the action of a vibrating device.
8. In a machine for making wax paper the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath and a suction member for removing moisture.
9. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and a suction member with which the paper has mechanical contact during its travel after leaving the bath.
10. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and means for removing moisture from the paper after leaving the bath, the same comprising devices contacting with opposite sides of the paper, and means for withdrawing the moisture by suction.
11. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and means for removing moisture from the paper after leaving the bath, the same comprising hollow suction members extending transversely the paper web and contacting with opposite sides thereof and provided with suction orifices for withdrawing the moisture.
12. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and means for removing moisture from the paper comprising suction members operatively related to opposite sides of the paper web.
13. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and
means for removing moisture from the paper web comprising hollow suction members extending transversely the paper web and bearing against opposite sides thereof, said members being provided with a series of suction orifices.

14. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and means for removing moisture from the paper web, the same comprising suction devices operatively related to opposite sides of the paper web, and wiping means engaging opposite sides of the paper web to wipe away the surplus moisture.

15. In a machine for making wax paper, the combination with paper guiding, feeding means, of means for applying heated wax thereto, means for subjecting it during travel to the action of a cooling bath, and means for removing moisture from the paper web, the same comprising means for vibrating the sheet or web after it leaves the bath and wiping devices operatively related to opposite sides of the web.

In testimony whereof we have signed our names to this specification.

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