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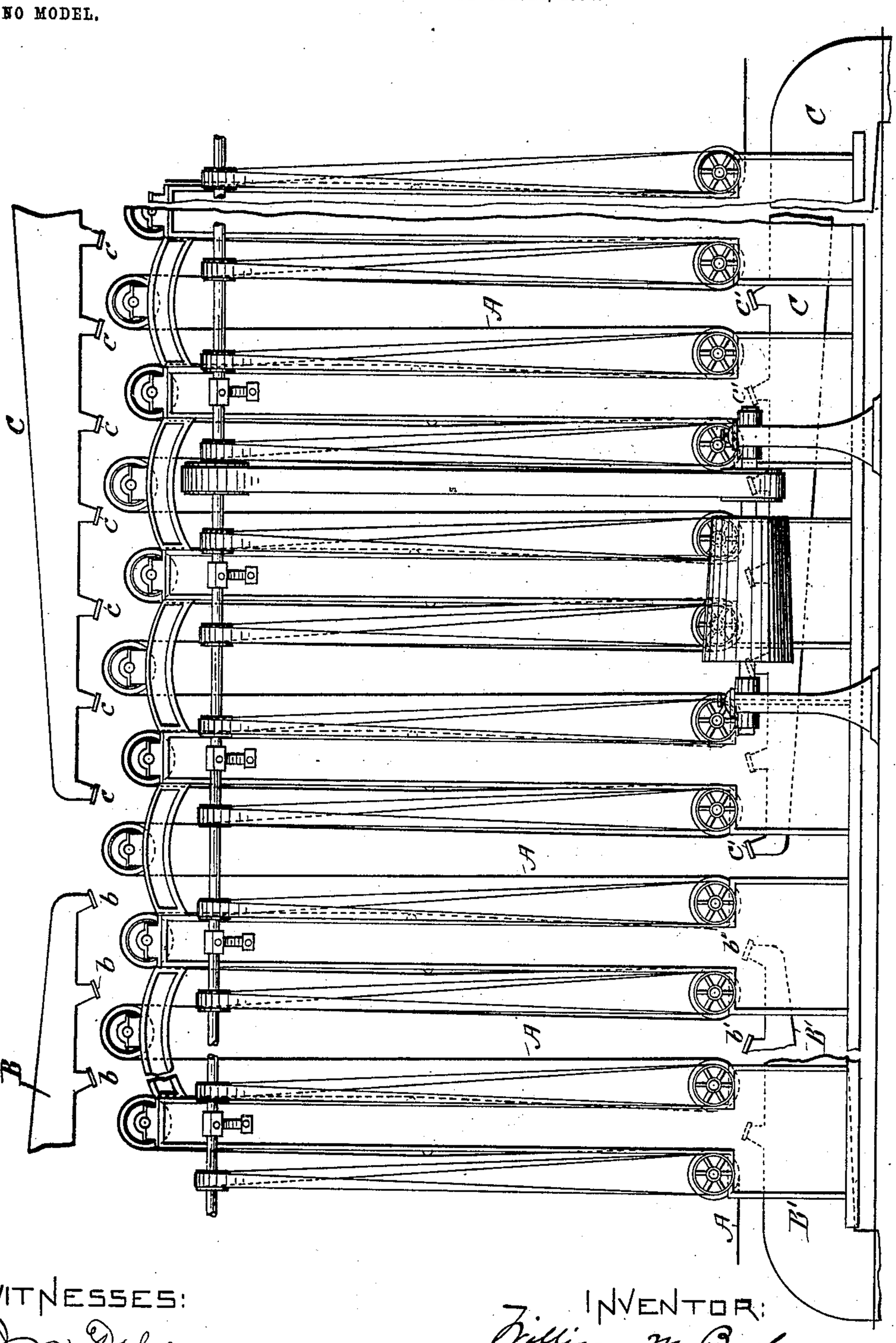
W. M. BARBER.

METHOD OF DRYING PAPER.

APPLICATION FILED OCT. 24, 1902.

NO MODEL.



WITNESSES:

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No. 763,242. Patented June 21, 1904.

UNITED STATES PATENT OFFICE.

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METHOD OF DRYING PAPER.

SPECIFICATION forming part of Letters Patent No. 763,242, dated June 21, 1904.

Application filed October 24, 1902. Serial No. 128,683. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM M. BARBER, a citizen of the United States, and a resident of Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in the Methods of Drying Paper, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention consists in the following-described method of drying paper.

Heretofore it has been the custom to dry paper in the web as it passes from calender-rolls to winding-rolls by means of currents or blasts of heated air directed against both surfaces. While this method answers well for drying certain grades of paper, I have ascertained that it is not always expedient to subject the web at once to the drying action of heated dry air. This is especially true of sized papers of good quality in which it is desirable to thoroughly, uniformly, and quickly set the size between the sizing apparatus and the winding-rolls.

My present invention consists in subjecting the sized or other web as it passes from the sizing apparatus or any part of the paper-making machinery to the winding-roll, first, to the action of currents or blasts of cool air which are directed against one or both surfaces of the web and which act to thoroughly, uniformly, and quickly set the sizing in the web, and, second, to subject the sized web thus treated to the drying action of heated air, by which all the moisture is removed from the web. It will be understood that these steps of my invention follow each other continuously upon the passing web and that the web is held in a state of more or less tension by means of a grid about which it is caused to pass or is drawn.

I have employed for subjecting the sized web to the size-setting blasts of cool and heated air an apparatus similar in every respect to that described in my application for Letters Patent of the United States filed November 20, 1901, Serial No. 83,007.

The invention will now be further described in conjunction with the drawing forming a part of this specification, where I have shown, principally in elevation, portions of the size-setting apparatus and portions of the paper-drying apparatus.

The mechanism for feeding the web and for disposing it in the form of a grid, the form which I prefer for both setting the size and for drying the paper, is like that of my Letters Patent No. 690,629, dated January 7, 1902.

A represents the web of paper passing through both apparatus. The latter is in every respect like the paper-drying apparatus of the said patent. The paper-sizing apparatus comprises, in addition to the mechanism to which I have referred, means for forcing currents of cool air against both surfaces of the passing web. This means is similar to that which is employed for forcing heated currents of air against the surfaces of the passing web in drying it, and it comprises an open duct or passage B, through which the cool air is forced by any desirable means and which passage terminates in suitable directing nozzles or outlets *b*, and a lower duct or passage B′, through which cool air is also forced and which has the directing outlets or nozzles *b*′.

C C′ are the ducts or passages provided with directing nozzles or outlets *c c*′, respectively, through which heated air is forced and directed upon the surfaces of the web, and they form a portion of the paper-drying apparatus.

For setting the size I prefer to use dry air which is cooled to a temperature between 40° and 70° Fahrenheit. For drying the web I prefer to use dry air heated to from 80° to 130° Fahrenheit. The cool air may be cooled by passing through a condenser or in any other desired way, and it is fed under pressure through the ducts or passages to the surfaces of the paper.

The operation of the device is as follows: The web of paper passes from the sizing apparatus or any part of the paper-making machine first through the size-setting grid,

where it is subjected to the action of currents or blasts of cool air, preferably directed upon both surfaces of the passing paper and which causes the sizing to be set uniformly, thoroughly, and expeditiously in the paper and without causing the paper to become wrinkled or uneven in any way. The web, with the sizing thus set by the action of the cool air, then continues through the drying-grid, where it is subjected to the action of drying-currents of heated air which serve to eliminate the moisture from the sized web.

The product obtained from the employment of this method is superior to that obtained where a size-setting apparatus is not used, and it much resembles the superior grades of paper now cured by what is known as the "loft-drying" process. In some respects it is superior in that it is more uniform in quality throughout and in that it is free from the unevenness produced by warping, as the setting and sizing operations are rapidly performed and with the paper under tension, thus securing a uniformity of result unknown in the loft-drying process.

While I prefer that the size-setting currents of cool air and drying-currents of heated air be directed against both surfaces of the passing web, I would not be understood as limiting the method to such an application of the currents. I would not be understood also as limiting the invention to sized papers, but may employ it upon other papers as well, either during their manufacture or afterward.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The process herein described of drying a moving, sized web of paper consisting in first subjecting the moving web to the influence of cool air caused to be moved in contact with it and then subjecting the moving web to the influence of hot air, also caused to be moved in contact with it.

2. The process herein described of drying a moving, sized web of paper consisting in first subjecting both surfaces of the moving web to the influence of forced currents of cool air directed to pass against them and then subjecting both surfaces of the said moving web to forced currents of heated air, also directed to pass against them.

3. The process herein described of drying a moving, sized web of paper consisting in first subjecting the said moving web to the influence of cool air, in temperature not less than 40° or more than 70° Fahrenheit, then subjecting the said moving web to the influence of dry, hot air, in temperature not less than 80° and not more than 130° Fahrenheit.

4. The process herein described of drying a moving web of moist paper consisting in first subjecting the said moving web to the influence of cool air caused to be moved in contact with it and then subjecting the moving web to the influence of hot air, also caused to be moved in contact with it.

5. The process herein described of drying a moving web of moist paper consisting in first subjecting both surfaces of the moving web to the influence of forced currents of cool air directed to pass against them and then subjecting both surfaces of the said moving web to forced currents of heated air, also directed to pass against them.

6. The process herein described of drying a moving web of moist paper consisting in first subjecting the said moving web to the influence of cool air, in temperature not less than 40° or more than 70° Fahrenheit, then subjecting the said moving web to the influence of dry, hot air, in temperature not less than 80° and not more than 130° Fahrenheit.

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Witnesses:
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