C. E. POPE.

METHOD AND MACHINE FOR MAKING PAPER.

APPLICATION FILED MAR. 26, 1918.

1,326,615.

Patented Dec. 30, 1919.

2 SHEETS—SHEET 1.

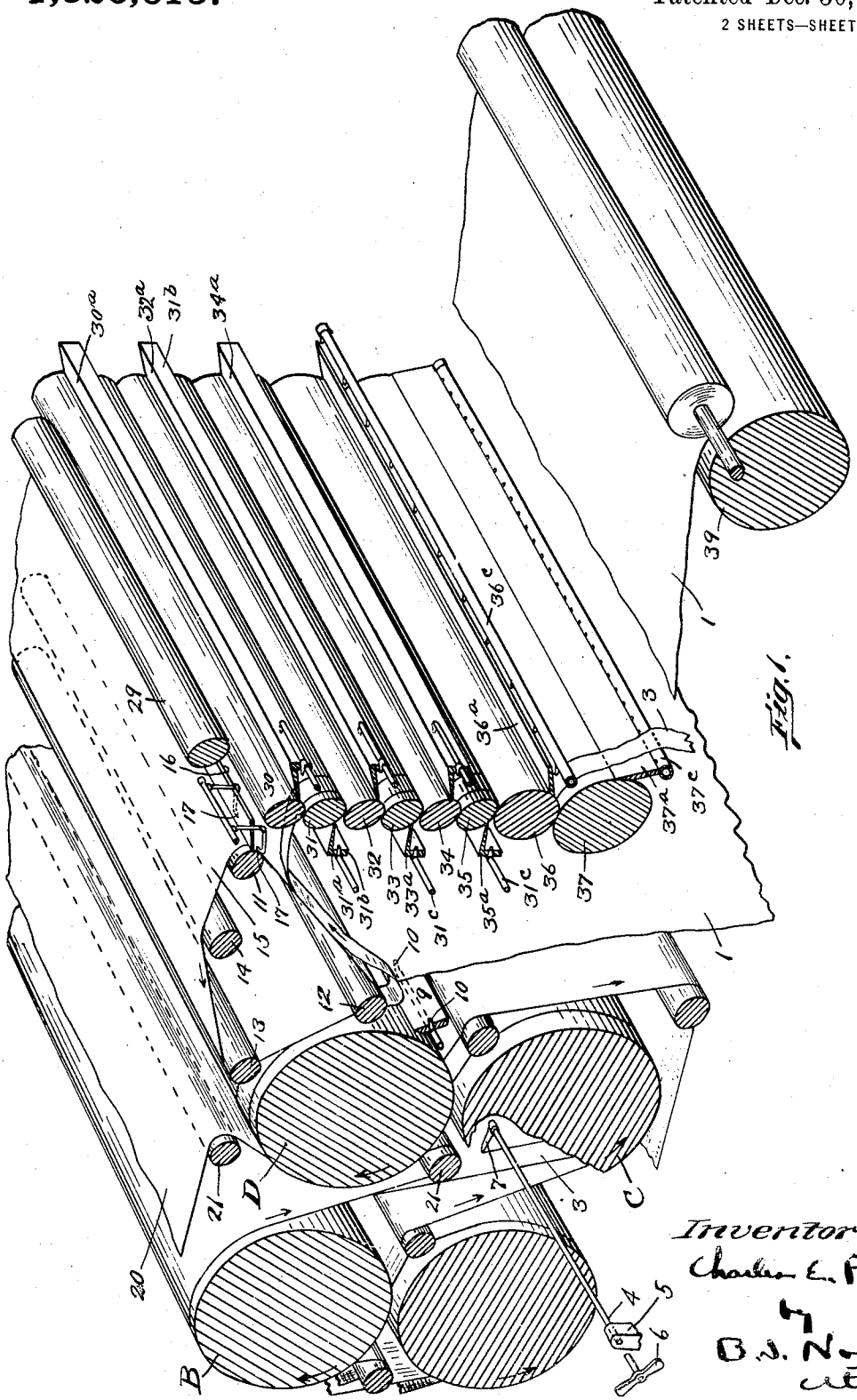


Fig. 1.

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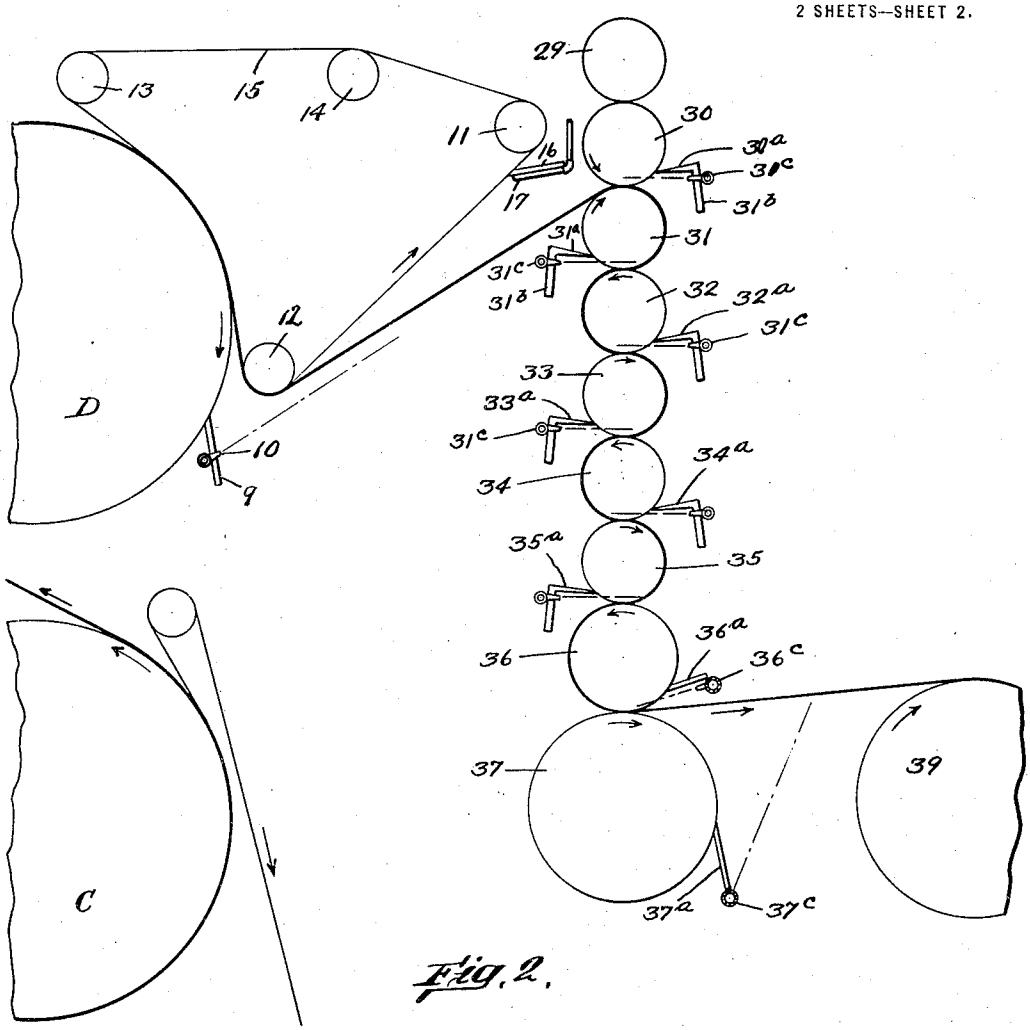


Fig. 2.

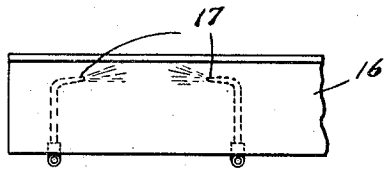


Fig. 3.

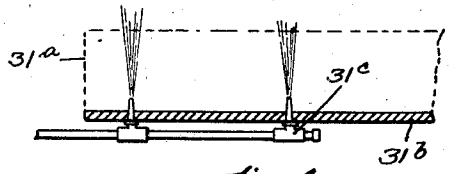


Fig. 4.

Inventor,
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UNITED STATES PATENT OFFICE.

CHARLES E. POPE, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO GREAT NORTHERN PAPER COMPANY, OF MILLINOCKET, MAINE, A CORPORATION OF MAINE.

METHOD AND MACHINE FOR MAKING PAPER.

1,326,615. Specification of Letters Patent. Patented Dec. 30, 1919.

Application filed March 26, 1918. Serial No. 224,746.

To all whom it may concern:

Be it known that I, CHARLES E. POPE, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented an Improvement in Methods and Machines for Making Paper, of which the following is a specification.

This invention consists of a process and machine for carrying the paper from the drying rolls to and through the calenders of a paper making machine which is substantially automatic. It is in part an improvement on the arrangement described and claimed in my Patent No. 992,688 of May 16, 1911, for carrying the paper automatically from the driers to the calenders. As a part of my improvement an opposed air blast is used which is claimed broadly in connection with my pending application Serial No. 222,467, filed March 14, 1918.

Figure 1 shows a perspective view of my invention and Fig. 2 a side view, certain well known parts not relating to this particular invention being omitted.

Fig. 3 shows the opposed air blasts as applied to the doctor 16, and Fig. 4 shows the arrangement of air blasts as applied to the doctor 30ª.

When the paper is first threaded through the machine on starting, or after a break, the front end of the paper emerges from between the last drier D and the usual felt 20 guided by the rolls 21 and continues on the drier until met by the scraper 9, which detaches it from the drier as shown in my Patent No. 992,688 above referred to. The paper, which at first is only a narrow lead strip then runs through the floor (the slot not being shown) or otherwise to waste. Hitherto it has not been the practice to carry this lead strip to the calenders until the sheet of paper has been broadened out to its full width and is running through the driers satisfactorily formed and dried.

When the formation of the sheet is satisfactory and it is desired to carry the sheet over to the calenders, I form a narrow lead strip 3, preferably about 6 inches wide, from the full sheet, and carry this strip over and through the calenders as herein described. Later I broaden out this narrow lead strip until the whole width of sheet is passing through the calenders. The operation of this device will readily be understood by an examination of the drawings, in connection with the following description:

The full width sheet 1, coming from the upper drier D, passes directly downward through an opening in the floor not shown. When this sheet is satisfactorily formed, a lead strip 3 is formed from it in the following manner:

A rod 4 is passed through suitable bearings, attached to any suitable part of the machine or other support. This rod 4 has a handle 6, extending outside the line of the driers and the rod is long enough so that it may be pushed entirely across the machine. At the other side of the bearing 5 from the handle, the rod has attached a knife 7. Although the lead strip former may be located near any of the drying rolls, I preferably arrange it near the path of the sheet of paper before it passes to the last drier for instance between drier B and C so that by turning the handle 6 the knife 7 will be forced against the paper passing from drier B to drier C and so before it comes to the last drier at any desired point in the width of the paper sheet. In practice I prefer to cut the paper at a point about six inches from the edge of the paper sheet. This lead strip 3 then passes along like the rest of the paper sheet 1 through the opening in the floor to waste. The knife is left in position continuously cutting the paper to form this lead strip until the operation of carrying over the lead strip through the calenders is successfully performed.

In order to carry this lead strip from the last drier to the calenders, I arrange a doctor 9, preferably running the entire width of the drier which detaches the sheet of paper, including the lead strip from the drier D, and leads it to waste as long as desired. This doctor 9 has associated with it an air passage or series of air passages 10, here shown as passing directly through the doctor at the end where the lead strip is formed, the force of which carries the lead strip along as hereinafter described.

In order to bridge the gap between the last drier and the calenders, I arrange a series of guide rolls 11, 12, 13 and 14, one of which is a driving roll for driving and guiding a felt 15. The roller 12 is placed close to the drier D at the point where it is desired that the paper shall leave the drier and may have the usual tension device and

the felt 15 passes from the roller 12 to a roller 11, placed near and somewhat above the line of the second and third calender rolls, counting from the top, between which the paper is first to pass to be calendered. From the roll 11 the felt passes around a roller 14, by which its tension may be adjusted, and a roller 13 above a drier D, from which the felt 15 passes in contact with the paper sheet being led through the last drier. Below the roller 11 and in contact with the felt is placed a doctor 16, preferably of metal to remove the paper sheet from the felt.

When the lead strip 3 has been formed and everything is ready to pass it over to the calenders, the air blast is turned on through the air passage 10 and the lead strip blown outwardly from the drier into contact with the felt 15, which, in conjunction with the air blast from the passages 10 carries the lead strip along toward the roller 11. The static electricity usually present also assists. The nozzles 17 of an air blast, described and claimed in my application, Serial No. 222,467, filed March 14, 1918, are arranged at one end of the doctor 16 and the air blast directed through these nozzles 17 detaches the lead strip from the doctor, so that the lead strip passes between the rolls 30 and 31 of the calender stack.

Each of the calender rolls 30 to 35, inclusive, is provided with a doctor 30^a, 31^a, 32^a, 33^a, 34^a, and 35^a, (having if desired downwardly projecting arms, as 31^b,) to detach the paper sheet from the rolls if it should adhere to a roll beyond its point of contact with the next lower roll, and to direct it into contact so as to pass between the calenders beneath. An air passage, as 31^c, is provided for each of the doctors 31^a to 35^a inclusive, to detach the lead strip from the doctor and direct it to the next lower roll.

I prefer to use two blasts directed as shown by the dotted line, Fig. 2, which impinge on the calender roll near the point of detachment of the paper from the calender and push the paper downward, but any air blast may be used which will clear the paper from the doctor, and not interfere with the progress of the paper if this feature of my invention is not desired or none at all. I find however, that the air blast placed as described is very useful.

The doctor 36^a for the roll 36 preferably lacks the downward arm as 31^b of the other doctors, as such arm might interfere with the passage of the paper to the reel, not described. An air passage 36^c, however, is provided, which serves to direct the paper sheet to the roll 37. I prefer to extend this air passage entirely across the machine. The roll 37 is provided with a doctor 37^a, and a perforated pipe, 37^c, extends substantially across the roll at the back edge of the doctor and serves to initially direct the paper sheet from said doctor to reel 39. Until after the lead strip 3 has been satisfactorily led through the calenders the main body of the sheet is permitted to pass through the floor into the waste pit and the lead strip is allowed to run to waste over the doctor 37^a at the end of the calender stack. When the lead strip is running through the calender satisfactorily, it is broadened by pressing the rod 4 inward until the entire sheet is passing through the calenders and to waste over the doctor 37^a. The paper is then carried to the reel in any suitable manner, as by hand or as described in my Patent No. 1,248,542, of December 4, 1917, or otherwise.

It will be apparent from the foregoing description that the operation of my invention is as follows:

The paper sheet is passed through the driers in the usual way until a sheet of the entire width, properly formed, is passing from the doctor 9 to waste. Thereupon the operator turns the handle 6, pressing the knife 7 against the sheet at a point about 6 inches from its edge, so that the lead strip 3 is separated from the remainder of the sheet and the lead strip and the remainder of the sheet continues to pass to waste as before. Air is now turned on through the passages 10 through the doctor 9 and the lead strip 3 is broken by the air blast and its end portion carried by the air blast and the felt to the doctor 16. Before the end strip reaches the doctor 16 the air is turned through the air passages 17 and the opposed air blast thus formed lifts the paper from the felt and causes it to pass between the calenders 30 and 31. Meanwhile, air has been turned through the air passages in the various doctors 30 to 36, inclusive, and the sheet guided by the doctors and the air threads itself without intervention of the operator through the calenders from top to bottom and passes to waste over the doctor 37^a. When the lead strip is running through the calenders satisfactorily the rod 4 is pushed inwardly and the width of the lead strip is increased until the remainder of the strip has been completely incorporated with the lead strip, so that the entire sheet is passing over the doctor 37^c. The paper is then ready to be carried to the reel.

In the foregoing description I have assumed that the full sheet will be carried through the driers before the lead strip is carried to the calenders, as is the present usual practice in paper mills, but it is my preferred practice to take the lead strip directly as it passes through the driers from the felts and carry it to the calenders without the intermediate carrying of the full width of the sheet through the driers. It is obvious that there is a great saving in waste by this practice. The use of the knife 7

will be unnecessary if only a lead strip is running through the driers when the paper is carried over, but this knife should be available because in case of a break after the paper has left the driers, it is convenient to have mechanical means for forming an end strip, rather than to attempt to form it by hand.

In this specification I have described the use of doctors as 31ª, etc., with the calenders and I consider these doctors to be very useful, but if a sufficiently powerful blast of air is employed directed as described in my specification, the use of such doctors may be entirely avoided. By the use of such doctors, however, a saving of air is effected.

If the paper is carried through the calenders by hand there is danger that employees will lose their fingers or hands by catching them in the calenders. Prior to my invention, mechanical guiding strips have been placed to direct the course of the paper from the bite of one calender to the bite below, but such guiding means are harmful rather than helpful at the high speed at which my machines operate and it is a valuable feature of my invention to do away entirely with the use of such guiding strips, which are likely to clog the progress of the paper, replacing them by the air blast directed to impinge on the upper roll and lead the paper against the lower calender without any possible clogging effect.

I claim:

1. The combination with the driers and calenders of a paper-making machine of means arranged to form a lead strip separated from the paper sheet at a point prior to the passage of the paper sheet around the last drier and to broaden said strip as desired, means arranged to remove the paper from the last drier and direct it to a traveling felt, a traveling felt arranged to receive the paper sheet from the drier and carry it adjacent to the calenders, means arranged near the end of the transverse of the felt to remove the paper sheet from the felt and pass it between the calenders and a series of doctors and air blasts associated therewith arranged to guide the paper strip through the calenders substantially as described.

2. The combination with the driers and calenders of a paper-making machine of an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next lower calender, and pneumatic means for blowing the paper sheet from the last calender to the reel.

3. The combination with the driers and calenders of a paper-making machine of an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next lower calender.

4. The combination with the driers and calenders of a paper-making machine of means arranged to form a lead strip separated from the remainder of the paper sheet and broaden the same as desired, an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next lower calender.

5. The combination with the driers and calenders of a paper-making machine of means arranged to form a lead strip separated from the remainder of the paper sheet and broaden the same as desired, an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next

lower calender, and pneumatic means for blowing the paper sheet from the last calender to the reel.

6. The combination with the driers and calenders of a papermaking machine of an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means consisting of opposed air blasts for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next lower calender.

7. The combination with the driers and calenders of a paper-making machine of means arranged to form a lead strip separated from the remainder of the paper sheet and broaden the same as desired, an endless felt arranged between the last drier and the calenders and means for causing the lower surface of the felt to travel from a point adjacent the last drier to a point adjacent the first pass of the paper between the calenders, pneumatic means to transfer a lead strip from the last drier to the traveling felt, pneumatic means consisting of opposed air blasts for transferring the lead strip from the traveling felt to the first pass between the calenders, scrapers to remove the paper from each calender after finishing its pressure by the same, and an air blast impinging on the calender from which the paper is to be removed, and guiding the paper into contact with the next lower calender.

8. The method of carrying the paper over from the driers of a paper-making machine to and through the calenders, which consists in passing the entire width of the paper sheet through the driers to waste, then forming a narrow lead strip from the remainder at a point prior to its passage over the last drier, then removing the lead strip from the last drier and blowing it against guiding and carrying means which carry it adjacent to the calenders, then removing it by opposed air blasts from the said carrying means and directing it so that it passes to the calenders and removing it from each calender roll and blowing it to the next bite and then broadening out the lead strip to include the entire width of the paper.

9. The method of carrying the paper over from the driers of a paper-making machine to and through the calenders, which consists in passing the entire width of the paper sheet through the driers to waste, then forming a narrow lead strip from the remainder at a point prior to its passage over the last drier, then removing the lead strip from the last drier and blowing it against guiding and carrying means which carry it adjacent to the calenders, then removing it by blowing from the said carrying means and directing it so that it passes to the calenders and removing it from each calender roll and blowing it to the next bite and then broadening out the lead strip to include the entire width of the paper.

10. The combination with the driers and calenders of a paper-making machine, of means for taking over the paper sheet from the last drier to the calenders consisting of an endless traveling felt and pneumatic means for causing the paper to pass to the felt and adhere there by means of a static charge of electricity carried by the paper, and pneumatic means to detach the sheet from the felt and pass it to the calenders.

11. The combination with the drier and calenders of a paper-making machine, of a traveling felt in contact with the last drier and extended in proximity to the calender stack to transfer the paper sheet from the driers to the calenders.

12. The combination with the driers and calenders of a paper-making machine, of means to form a lead strip prior to the last drier and to broaden said strip to the full paper sheet, means to transfer said lead strip from the last drier to a point adjacent the calenders and means to direct it into and through said calenders.

13. In combination with the calenders of a paper machine a doctor, arranged to strip the paper from an upper calender and an air passage arranged to direct air against such upper calender roll beneath the point of contact of said doctor therewith, so as to impinge on said roll and be directed against the paper passing between such upper calender and the lext lower calender and press the paper against the same.

14. In combination with calenders of a paper machine a doctor, arranged to strip the paper from an upper calender and an air passage arranged to direct air substantially horizontally against such upper calender roll beneath the point of contact of said doctor therewith, so as to impinge on said roll and be directed against the paper passing between such upper calender and the next lower calender and press the paper against the same.

15. In combination with calenders of a paper machine a doctor, arranged to strip the paper from an upper calender and an air passage arranged to direct air against such upper calender roll beneath the point

of contact of said doctor therewith, so as to impinge on said roll and be directed against the paper passing between such upper calender and the next lower calender and press the paper against the same, and an unobstructed space beneath said doctor for the passage of the air and paper.

16. In combination with the calenders of a paper machine a doctor, arranged to strip the paper from an upper calender and an air passage arranged to direct air substantially horizontal against such upper calender roll beneath the point of contact of said doctor therewith, so as to impinge on said roll and be directed against the paper passing between such upper calender and the next lower calender and press the paper against the same, and an unobstructed space beneath said doctor for the passage of the air and paper.

17. The method of carrying the paper through the calenders of a papermaking machine which consists in directing a powerful current of air substantially horizontally against each calender roll at a point slightly above the lowest portion thereof and in a direction opposite to its line of movement, so as to cause said powerful blast of air to impinge upon said calender roll and strip the paper from said upper roll in case it is adherent thereto and press said paper against the next lower roll.

In testimony whereof, I have signed my name to this specification.

CHARLES E. POPE.