Jan. 26, 1932. R. A. STEFFEN 1,842,848

METHOD OF CALENDERING COATED PAPER

Filed Nov. 1, 1929

Fig. 1.

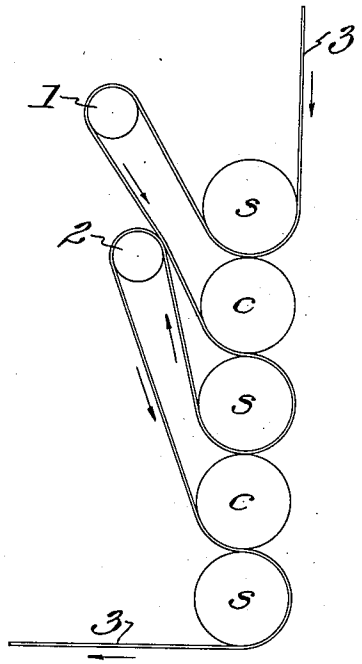
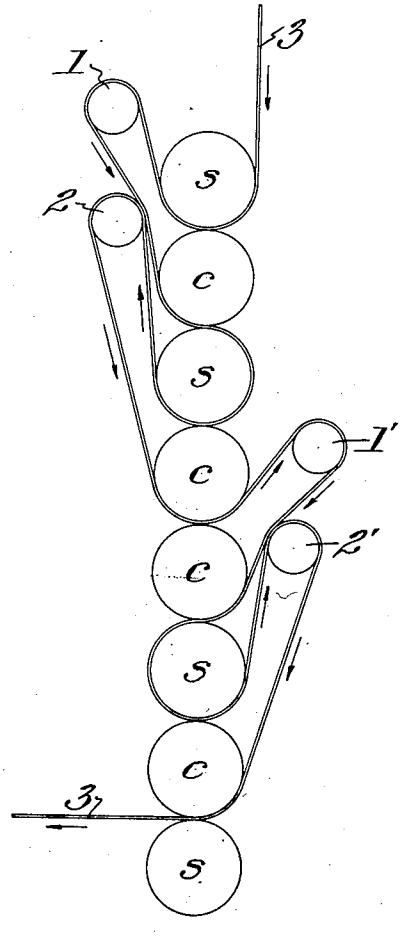


Fig. 2.



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UNITED STATES PATENT OFFICE

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METHOD OF CALENDERING COATED PAPER

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This invention relates to a method of calendering coated paper, an essential feature of which is that the paper being calendered is passed in frictional contact with a paper surface. A suitable procedure in accordance with my invention will now be described in connection with a suitable apparatus, it being understood that the invention is not limited to the details of procedure or to the particular apparatus or form and arrangement thereof excepting as may be required by the appended claims.

Referring to the accompanying drawings:

Fig. 1 is a diagrammatic representation of apparatus designed to calender paper having a coating on one side only and

Fig. 2 is a similar diagrammatic representation of apparatus designed to calender paper having a coating on both sides.

On both Figures 1 and 2 the letter S marks steel rolls and the letter C marks compressed fiber, e. g., cotton or paper rolls, both of the well-known types commonly used in so-called calender stacks. Suitable means, not shown, is of course provided for driving these rolls in the customary manner. On both figures of the drawings, 1 and 2 represent fly rolls. The apparatus of Fig. 2 comprises a second pair of fly rolls similar to 1 and 2 marked 1′ and 2′.

The operation is as follows:

Referring to Fig. 1, the paper, marked 3, bearing a coating on its left-hand side only as it enters the calender stack passes over the first steel roll of the stack then over fly roll 1, then over the second steel roll of the stack, then over fly roll 2 and then between the final compressed fiber and steel rolls of the stack. In passing over and between the stack rolls the paper receives the usual calendering treatment. The fly rolls 1 and 2 are so positioned that the coated side of the paper is brought into frictional contact with itself, the portion passing in one direction on its way from the roll 1 to the stack contacting with the portion passing in the opposite direction from the stack over the roll 2.

The operation of the apparatus illustrated in Fig. 2 is identical with that of the apparatus illustrated in Fig. 1, excepting that the paper is coated on both sides and after passing over the second fly roll 2 it passes between two contacting compressed fiber stack rolls, then over fly roll 1′, back over a steel stack roll, then over fly roll 2′ and back between the final compressed fiber and steel rolls of the stack. Thus the operation described in connection with Fig. 2 provides for a frictional contact of both sides of the paper each with itself, fly rolls 1 and 2 providing for the frictional treatment of one side and rolls 1′ and 2′ providing for the frictional treatment of the other side of the paper. In both operations, as described in connection with Figs. 1 and 2, the paper is subjected to a combined super-calender effect in passing between the alternate compressed fiber and steel rolls and a frictional treatment of paper with paper. As is apparent, this combined treatment might be provided in a number of ways, a calendar stack having a greater number of rolls might be used and the frictional treatment might be differently positioned with respect to the action of the calender rolls and might be repeated a number of times without departing from the spirit of my invention. Suitable known means may be provided for properly tensioning the paper and for varying the force of frictional contact between the passes of the paper over the fly rolls 1 and 2. In fact other means than the fly rolls 1 and 2 conceivably might be provided for frictionally contacting the paper with itself or the paper being calendered might be contacted with other paper provided for that purpose or other similar or equivalent surface.

The method of operation described has been found to give highly satisfactory results. The first pass of the paper through the calender stack with its coated side in contact with the steel roll produces a light calendering—enough to smooth the coating and prepare it for the frictional treatment. If this first slight calendering of the coated surface is omitted, the paper is apt to be too rough for the frictional treatment and long scratches on the finished paper are apt to result. Best results have been obtained as indicated by an initial, light calendering fol-

lowed by a frictioning and then a final calendering.

The method of calendering has been found, as compared with conventional calendering methods, to give less so-called blackening of the paper, a more uniform finish and surface, less loss of paper by waste due to the fact that less tension on the paper is required and consequently less breakage occurs, and a better quality of paper with respect to resiliency and printing qualities due to the fact that less nips in the calender stack are required to produce a given finish.

The frictional contact of paper with the surface of a compressed paper roll which may occur in the customary calendering process involving the use of alternate contacting metal and compressed paper rolls is not to be confused with the present invention, in which the surface of the paper being calendered is subjected to a relatively light and high velocity—as compared with the action of calender rolls—frictional contact with a sheet or web of paper or its equivalent as exemplified by the contact of two sheets or two portions of the same sheet of paper moving in opposite directions, one at least of said sheets or portions being unsupported or only relatively flexibly supported on its reverse side at the point or region of contact.

I claim:

1. Method of calendering coated paper comprising subjecting a coated side of the paper to frictional contact with the surface of paper in sheet form.

2. Method of calendering coated paper which comprises frictionally contacting a coated side of the paper with itself.

3. Method of calendering coated paper which comprises subjecting the paper to a partial calendering between calender rolls and then subjecting a coated side of the resulting partially calendered paper to a relatively light, high velocity frictional contact with a paper surface.

4. Method of calendering coated paper which comprises subjecting the paper to a partial calendering between calender rolls, subjecting a coated side of the resulting partially calendered paper to a relatively light, high velocity frictional contact with a paper surface and further calendering the paper.

5. Method of calendering coated which comprises passing a web of coated paper through a plurality of nips of a calender stack and subjecting a coated side of the paper to a relatively light, high velocity frictional contact with a paper surface between successive nips.

6. Method of calendering coated paper which comprises passing a web of coated paper through a plurality of nips of a calender stack and frictionally contacting a coated side of the paper after at least one nip with a coated side of the paper after a succeeding nip but before the final nip.

7. Method of calendering coated paper which comprises subjecting a coated side of the paper to a relatively light, high velocity frictional contact with a surface of paper in sheet form.

8. Method of calendering coated paper which comprises subjecting a coated side of the paper to a relatively light, high velocity frictional contact with a coated surface of paper in sheet form.

9. Method of calendering coated paper which comprises passing a web of paper coated on both sides through a plurality of nips of a calender stack, and frictionally contacting each side of the paper web with itself between the first and last nip.

In testimony whereof, I affix my signature.

RAYMOND A. STEFFEN.