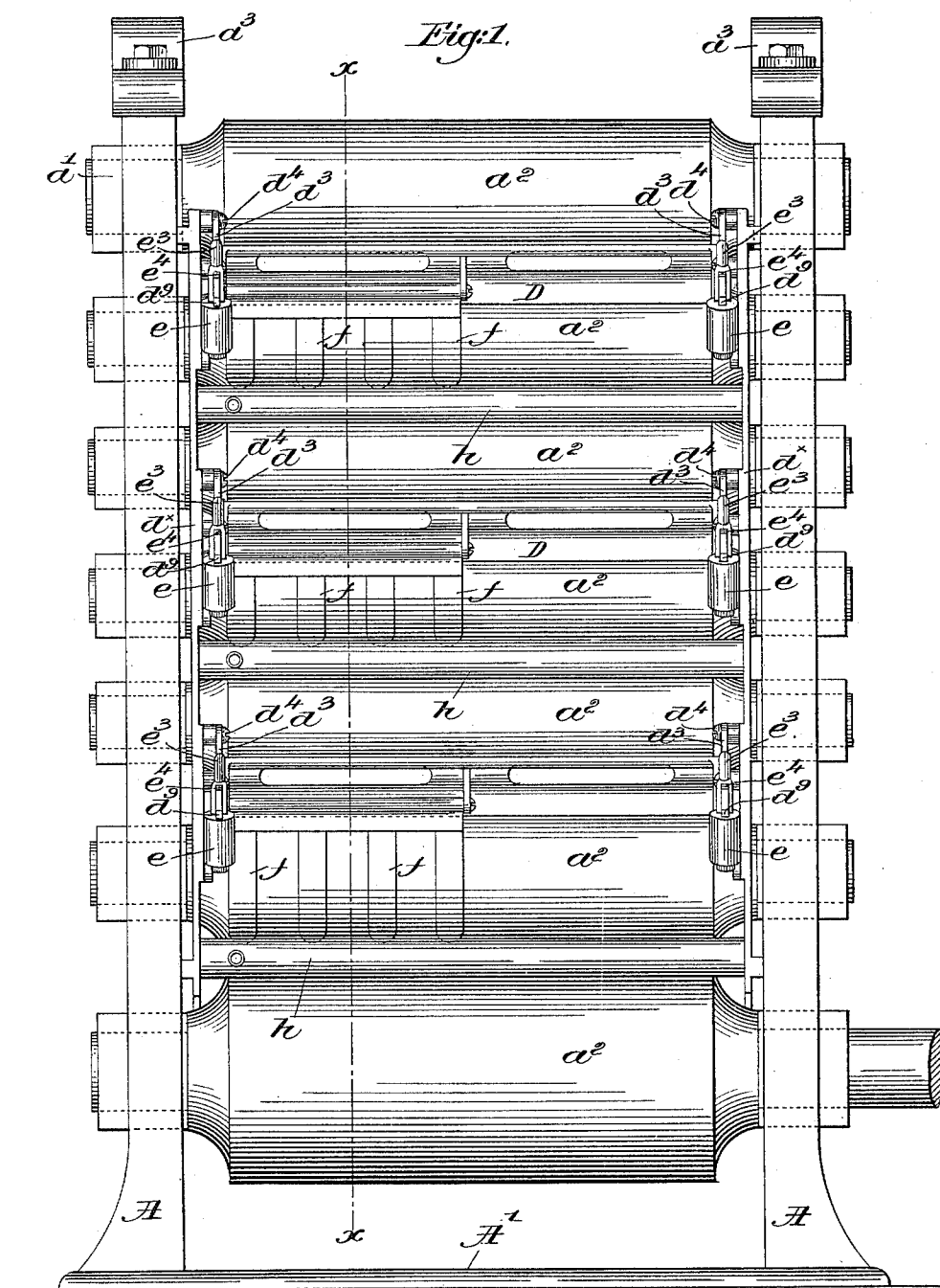


P. DILLON.
CALENDERING MACHINE.

No. 600,518.

Patented Mar. 15, 1898.



Witnesses.
Edward G. Allen.
Thomas Drummond.

Inventor
Peter Dillon.
by Leroy Segony, attys

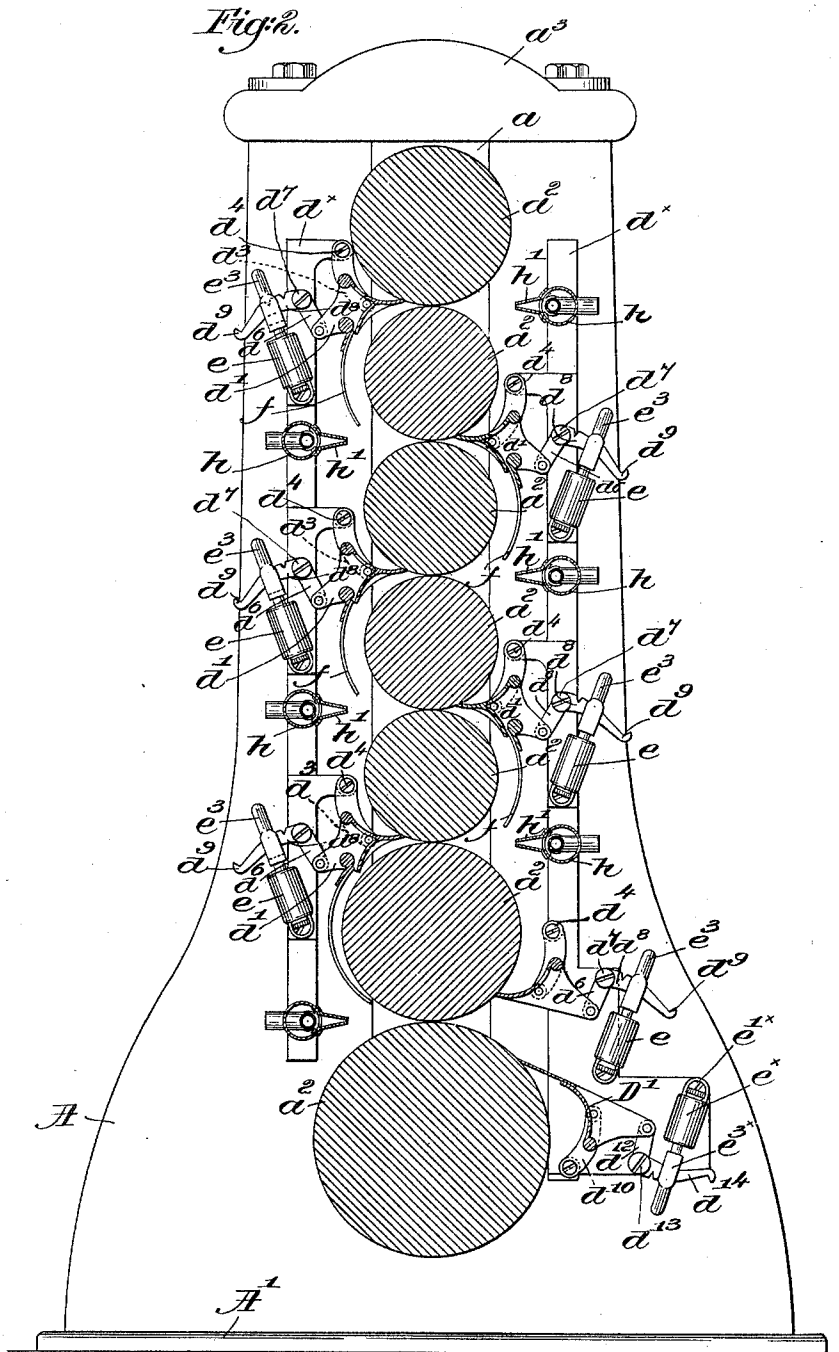
(Model.)

3 Sheets—Sheet 2.

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Edward G. Allen.
Thomas J. Hammond.

Inventor:
Peter Dillon,
by Crosby Gregory atty.

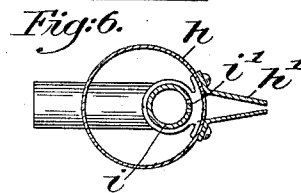
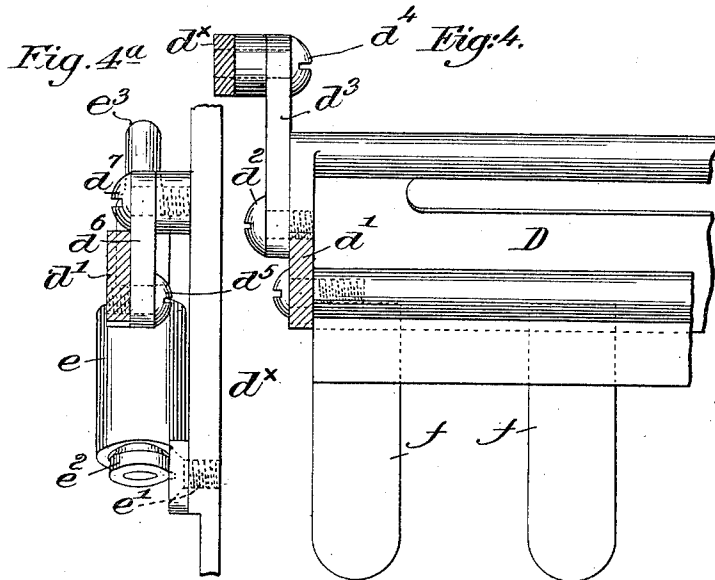
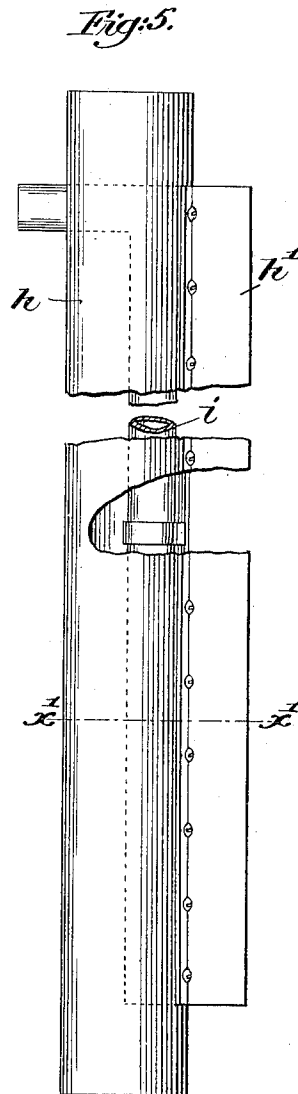
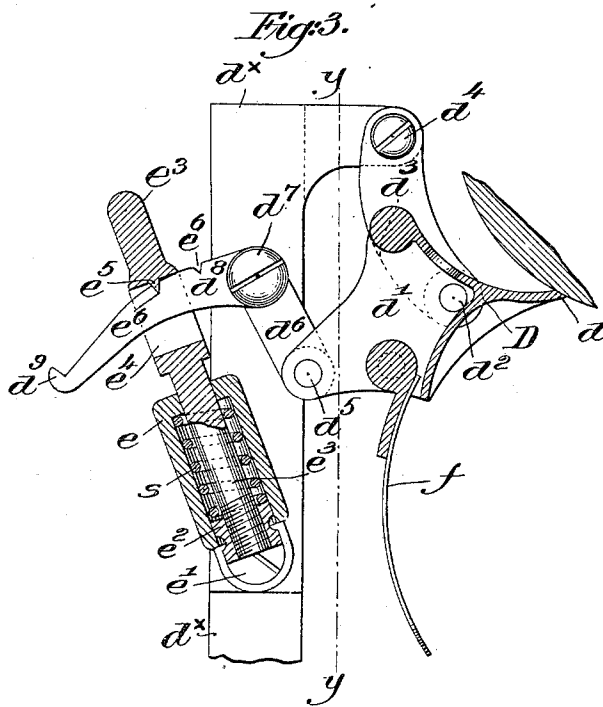
(Model.)

3 Sheets—Sheet 3.

P. DILLON.
CALENDERING MACHINE.

No. 600,518.

Patented Mar. 15, 1898.



Witnesses.

Thomas S. Summons,
Edward F. Allen

Inventor.

Peter Dillon,
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UNITED STATES PATENT OFFICE.

PETER DILLON, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO HENRY C. KING, OF SAME PLACE.

CALENDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 600,518, dated March 15, 1898.

Application filed May 1, 1895. Serial No. 547,768. (Model.)

To all whom it may concern:

Be it known that I, PETER DILLON, of Lawrence, in the county of Essex and State of Massachusetts, have invented an Improvement in Calendering-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention has for its object to provide an improved calendering-machine.

Calendering-machines comprehend, usually, a plurality or stack of rolls resting one upon another and running in suitable end bearings, 15 the paper being passed back and forth between the rolls, suitable devices called "doctors" being pressed against the different rolls to prevent the paper hugging any particular roll instead of passing to and about the next 20 of the series. In calendering-machines as now usually constructed these doctors are mounted at their ends upon journals forming a part of the doctors themselves or are arranged upon pivots directly connected with 25 the doctors to enable the latter to be swung toward or from their respective rolls. The journals or pivots, being connected directly to the doctors, do not, however, permit any change in the axial or alined position of the 30 doctor, and if, as is frequently the case, the rolls of the stack should, by reason of wear in the bearings or otherwise, settle slightly lower at one of their ends than at the other the doctors for the several rolls would contact with the latter at one, their lowest ends 35 only, and would therefore not operate properly upon the paper.

In accordance with one part of this present invention I mount the doctors in suitable 40 end-supporting connections of such character as will not only permit the doctors to be moved laterally and bodily toward and from their respective rolls, but will also permit the said doctors when moved against their rolls 45 to adjust themselves axially—that is, to change their alinement sufficiently to enable them to contact for their entire lengths with their rolls. In the preferred embodiment of my invention for accomplishing this result I 50 suspend the doctors at their ends in links jointed both to the doctors and to the supports from which the doctors are hung, there

being one or more links at each of the ends of the doctors, as may be found desirable.

My invention comprehends also various details of construction to be hereinafter described, and pointed out in the claims. 55

In calendering-machines as now constructed means are provided for moistening and cooling the paper as it passes between 60 the rollers. Such means as heretofore provided have consisted of one or more air-jets projected upon the paper, the air as it is projected acting to draw more or less water from a suitable source, which is mixed with the air 65 and deposited upon the paper.

In practice I have found that by the use of combined air and water jets the water is apt to be deposited upon the paper in globules of excessive size, and I have also found that the 70 nozzles through which the water is projected upon the paper must be so small in order to restrict the quantity of water used as to become readily clogged by sediment or foreign particles carried in suspension by the water. 75 To obviate this objection, my present invention comprehends the use of combined air and steam nozzles, the steam being utilized as the carrier to project itself and also a quantity of air drawn thereby upon the paper, 80 the contact of the steam with the air as the two are mixed acting to condense the steam and cause a deposit upon the paper of fine particles of moisture much like dew, I having found that I am enabled to more uniformly 85 moisten and cool the paper by this means than by the combined use of air and water.

Other features of my invention will be hereinafter described, and pointed out in the 90 claims.

In the drawings, Figure 1, in front elevation, shows a calendering-machine embodying my invention; Fig. 2, a vertical section of the same, taken on the dotted line *xx*; Fig. 95 3, an enlarged sectional detail showing one of the doctors and its attachments, the section being on the line *xx*, Fig. 1. Figs. 4 and 4^a are sections on the dotted line *yy*, Fig. 3, looking toward the right and left, respectively; 100 Fig. 5, a top or plan view, partially broken out, of the moistening or cooling device, and Fig. 6 a cross-section of the same on the dotted line *x'x'*.

In the embodiment of my invention selected for illustration and shown in the drawings, A are the two end frames of the calender, mounted upon a suitable base A', said end frames being provided with usual vertical slots a for the reception of the bearing-boxes a' of the several calender-rolls a'' , the slots a being closed at the tops of the end frames by suitable caps a^3 , all constructed and arranged to operate as is now customary in calenders in common use.

Referring now particularly to Figs. 2, 3, and 4, the doctors are shown at D, they preferably having a V-shaped cross-section, as shown, and adapted at their edges d to act against the calender-rolls. At their ends the doctors are preferably provided with end castings or heads d' , to which are jointed at d^2 the lower ends of links d^3 , jointed at their upper ends at d^4 to the end frames A or to suitable cheek-plates d^x applied thereto. (See Fig. 2.) In the construction shown also the said doctors have jointed to the outer ends of their heads d' at d^5 the lower ends of the arms d^6 of bell-crank levers pivoted at d^7 to the end frames or the cheek-plates d^x , attached thereto, the other arms d^8 being shown as sector-like in shape and adapted for attachment of the springs, as will be described. Assuming therefore that each doctor is hung at its opposite ends upon what in effect are two links d^3 d^6 , which constitute connections between the doctor and its support—viz., the end frame—which connections are jointed not only to the end frame but to the doctor also, it will be evident that the said doctor may have a lateral movement toward or from its calender-roll, and may also have a greater or less axial movement, whereby its alinement may be changed as desired.

Where a doctor has a body movement, one of its ends may be moved farther than the other without twisting the structure itself, but where it has simply a movement about a pivot one end cannot be moved farther than the other without twisting the structure. Hence the adaptability of my improved construction to rolls in which the alinement has changed.

Referring now particularly to Figs. 3 and 4, the doctors are pressed against their respective rolls by suitable springs s , (shown as coiled springs,) mounted upon suitable seats e (shown as cup-shaped) and pivoted at e' to the cheek-plates d^x . The springs at their ends opposite their seats act upon suitable collars e^2 , (shown as threaded upon the ends of the swing-rods e^3 ,) which pass through the springs and the seats therefor, and at their opposite ends are slotted, as at e^4 , to enable them to be slipped upon the sector-arm d^8 of the bell-crank levers described, the said spring-rods at the slots e^4 being provided with the detents e^5 to cooperate with suitable notches e^6 in the sector-arms d^8 to fix the adjusted positions of the spring-rods upon the said sector-arms.

When the calender is first set in operation, it is desirable that the doctors press against their respective rolls with greater force than after the calender has been in operation for some time, and therefore in starting the calender the spring-rods e^3 will be positioned upon the sector-arms of the bell-crank levers in the positions determined by the holding-notches e^6 , farthest removed from the pivots of the said bell-crank levers, the springs then acting through the greatest leverage and therefore with the greatest power to press the doctors against their respective rolls. If this spring-pressure were continued, the pressure of the doctors against their rolls would act shortly to heat the latter, and therefore after the calender has been operated for a time the spring-rods e^3 are moved inwardly to the innermost notches e^6 of their bell-crank levers to thereby partially relieve the pressure of the doctors upon the rolls to prevent heating, this reduced pressure being, however, sufficient to insure proper passage of the paper through the calender after the latter has once been fairly in operation.

The arms d^8 of the bell-crank levers are shown as provided at their outer ends with the stop projections d^9 , the curve of the arms being turned sharply inward, as shown, so that when the spring-rods e^3 are moved outwardly from the notches e^6 , farthest from the pivots d^7 , they will at once drop down to the stops d^9 , which hold them in position, yet entirely release the pressure of the doctor upon the roll.

Each doctor is provided, as herein shown, with depending guiding combs or fingers f to assist in directing the paper between the successive pairs of rolls.

So far as known to me I am the first to mount a doctor in such a manner as to provide for a lateral body movement toward and from its roll, whereby its alinement may be automatically changed to accommodate the alinement of the roll, and so far as known to me I am also the first to provide a sector through which the spring acts upon the doctor, whereby the acting point of the spring, which is the detent e^5 , may be changed as to its position to vary the pressure of the doctor upon its roll.

Referring now to Figs. 2, 5, and 6, I have provided opposite each doctor an air-supply pipe h , extending longitudinally of the rolls and opposite the bight between two adjacent rolls, said air-supply pipe being shown provided with a continuous nozzle h' , adapted to direct a jet or film of air into the bight between the rolls. Within this air-supply pipe h (see Fig. 6) I have in the present instance arranged a steam-pipe i , supplied with steam from a suitable source, and provided immediately back of the nozzle h' with one or more series of perforations i' , through which steam is directed into the nozzle from within the air-supply pipe.

In the operation of the calender steam ad-

mitted to the pipe i escapes through the perforations i' into the air-nozzle h' and draws air into the air-supply pipe and projects it, mixed with the steam, through the nozzle h' upon the paper at the bight between the rolls. As soon as the steam comes in contact and mixes with the air in the nozzle h' it is at once condensed by the air and is deposited by the latter upon the paper much in the form of dew—that is, in such fine particles that it cannot excessively moisten the paper, yet in such quantities as to keep the paper cool and sufficiently damp to enable it to receive the desired finished surface.

The perforations i' in the steam-pipe may be made sufficiently small to restrict the delivery of the steam without danger of becoming clogged, inasmuch as there are no foreign particles or substances carried in suspension by the steam, thereby making this device superior to devices wherein water is used, for water nearly always carries in suspension various foreign substances.

In Fig. 2 the doctor D' for the lowermost roll of the stack is reversed—that is, supported from its under side rather than suspended from its upper side, as with the other doctors, it being supported in practically the same manner upon links d^{10} and the arms d^{12} of bell-crank levers pivoted at d^{13} and having their sector-arms d^{14} acted upon by the spring-rods e^{3x} of the springs in the cup-shaped seats e^x , pivoted at e^x .

By the expression hereinafter used that the different portions of the doctor are maintained by its controlling connections in substantially unchanged position relatively to each other I mean that the doctor D is maintained by the links $d^3 d^6$ in unchanged right-side-up position as it is moved toward and from its roll—that is to say, the doctor is uniformly maintained in its substantially horizontal position whether in operative position against its roll or removed therefrom and cannot tip up when free from its roll.

My invention is not limited to the particular construction of parts herein shown and described, for it is evident the same may be varied without departing from the spirit and scope of my invention, and while I have herein shown doctors applied to all the rolls of the stack, yet they may be applied to a part only, if desired, and the number of rolls and the construction of the doctors may be varied, as desired.

I claim—

1. The combination with a roll, and bearings therefor, of a doctor, supports therefor, and a plurality of connections at opposite ends of the doctor and connecting the said doctor and supports, and pivoted both to the doctor and supports, substantially as described.

2. The combination with a roll and bearings therefor, of a doctor, supports therefor, connecting-links jointed both to the supports and doctor, and springs to move said doctor toward said roll, substantially as described.

3. The combination with a roll, its bearings, and a doctor hung to move bodily toward and from said roll, of a spring-lever fixedly pivoted at one end, and connected with and to move said doctor, and a spring and connections between it and said lever, permitting the acting point of the spring to be changed relatively to the said lever, substantially as described.

4. The combination with a roll, its bearings, of a doctor, a support therefor, supporting-links for and at the ends thereof and loosely pivoted to it and to its support, and pivoted bell-crank levers having one of their arms jointed to said doctor, and springs connected with their other arms, substantially as described.

5. The combination with a roll, and its bearings, of a doctor adapted to be moved toward and from the said roll, the pivoted bell-crank levers connected with said doctor, the springs, pivoted cup-shaped seats therefor, and the spring-rods adapted to engage the said bell-crank levers, and operate substantially as described.

6. The combination with a roll, and its bearings, of a doctor adapted to be moved bodily toward and from the said roll, the pivoted bell-crank levers, having notched arms, springs, and spring-rods adapted to engage the said notches, to hold said doctor normally pressed against said roll, substantially as described.

7. In an apparatus of the class described, a doctor, a support therefor and controlling connections between, and permitting relative movement of, said doctor and its support, said connections maintaining the different portions of the doctor in substantially unchanged position relatively to each other, substantially as described.

8. The combination with a calender, of an air-supply pipe provided with a nozzle opening adjacent and parallel to the calender-rolls, and a steam-pipe arranged within the said air-supply pipe adjacent said rolls and adapted to project steam into the said nozzle from within the air-supply pipe, whereby the steam is mixed with and condensed by the air immediately before the latter is projected from the nozzle, substantially as described.

9. In a calendering-machine, having a plurality of superimposed calendering-rolls, freely movable vertically, the combination with a roll thereof, of a doctor supported at its ends and automatically movable toward the roll, both ends simultaneously and either end bodily and independent of the opposite end, and means automatically so to move the doctor, substantially as described.

10. In a calendering-machine, having a plurality of superimposed calendering-rolls, freely movable vertically, the combination with a roll thereof, of a doctor supported at one side of the rolls, and arranged to have its front edge engage its roll close to the line of contact of said roll with the next adjacent roll, and means to permit movement of said

doctor both ends simultaneously and either
end independently toward the rolls, and to
cause it to follow the vertical, axial plane of
said roll as the latter moves vertically and to
5 maintain the engagement of the edge of the
doctor and the roll throughout their length
and on the line practically of initial engage-
ment, substantially as described.

In testimony whereof I have signed my
name to this specification in the presence of 10
two subscribing witnesses.

PETER DILLON.

Witnesses:

FREDERICK L. EMERY,
AUGUSTA E. DEAN.