

R. SMITH.
DOCTOR FOR CALENDER ROLLS.

No. 497,610.

Patented May 16, 1893.

Fig. 1.

Fig. 2.

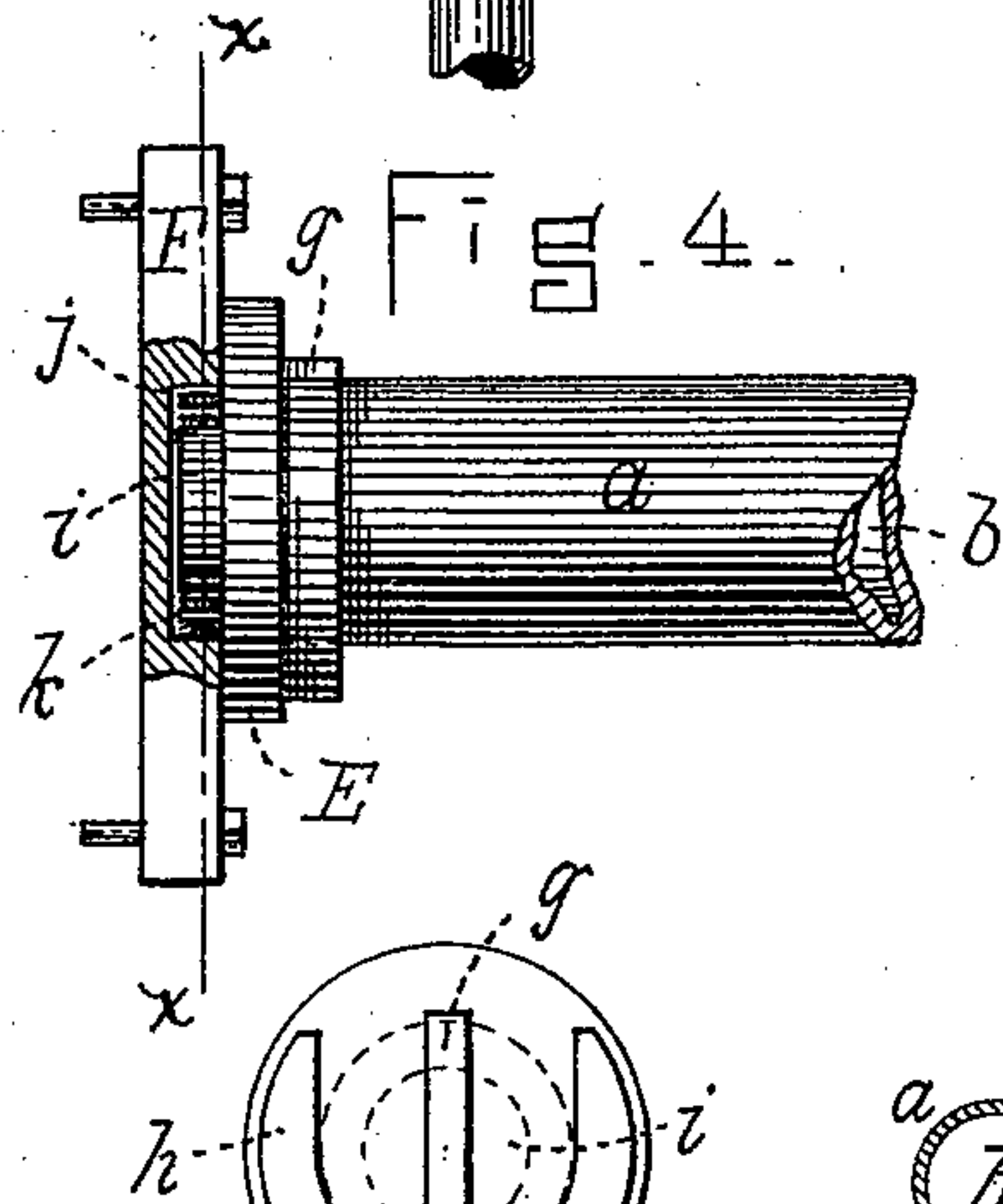
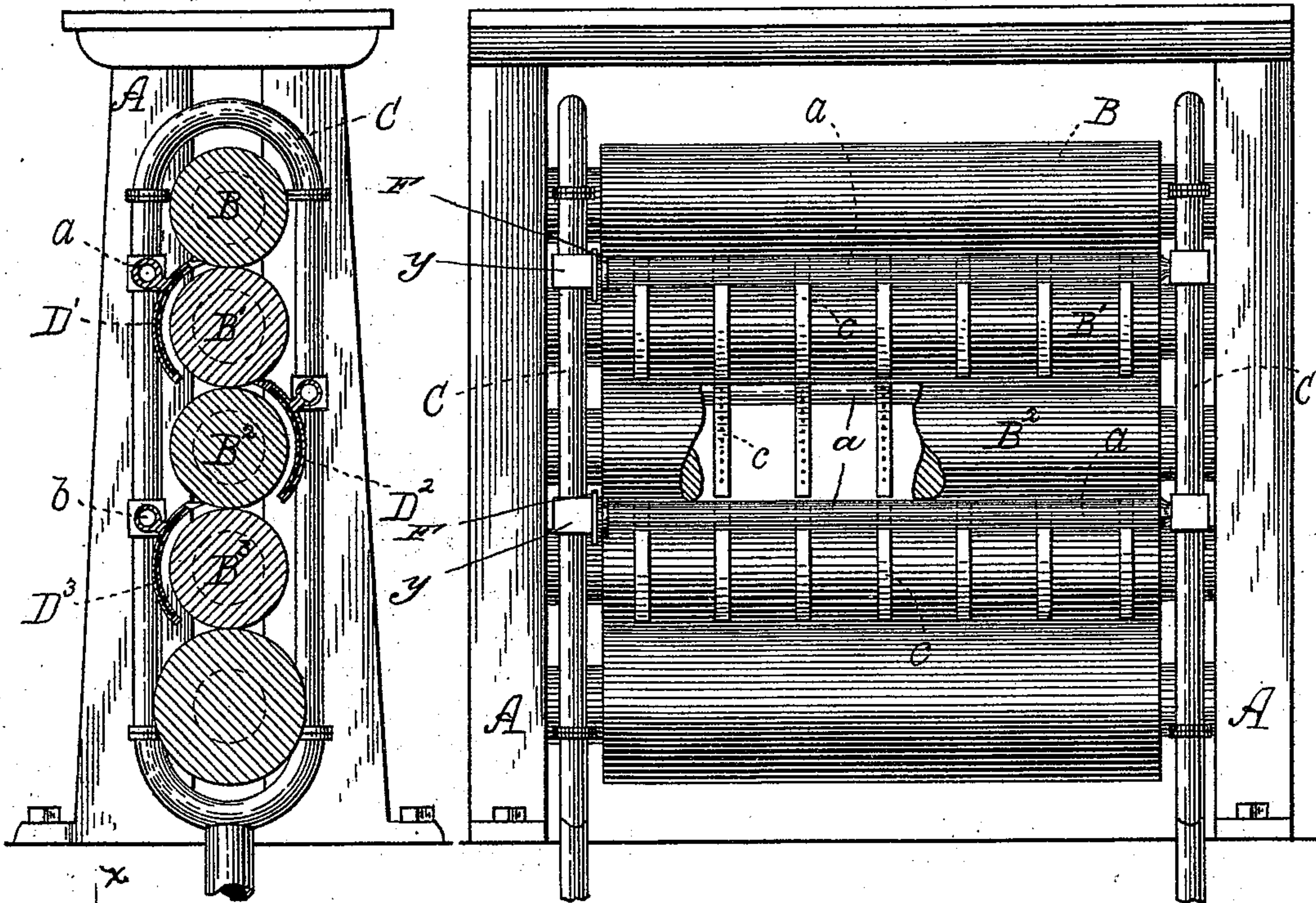


Fig. 3.

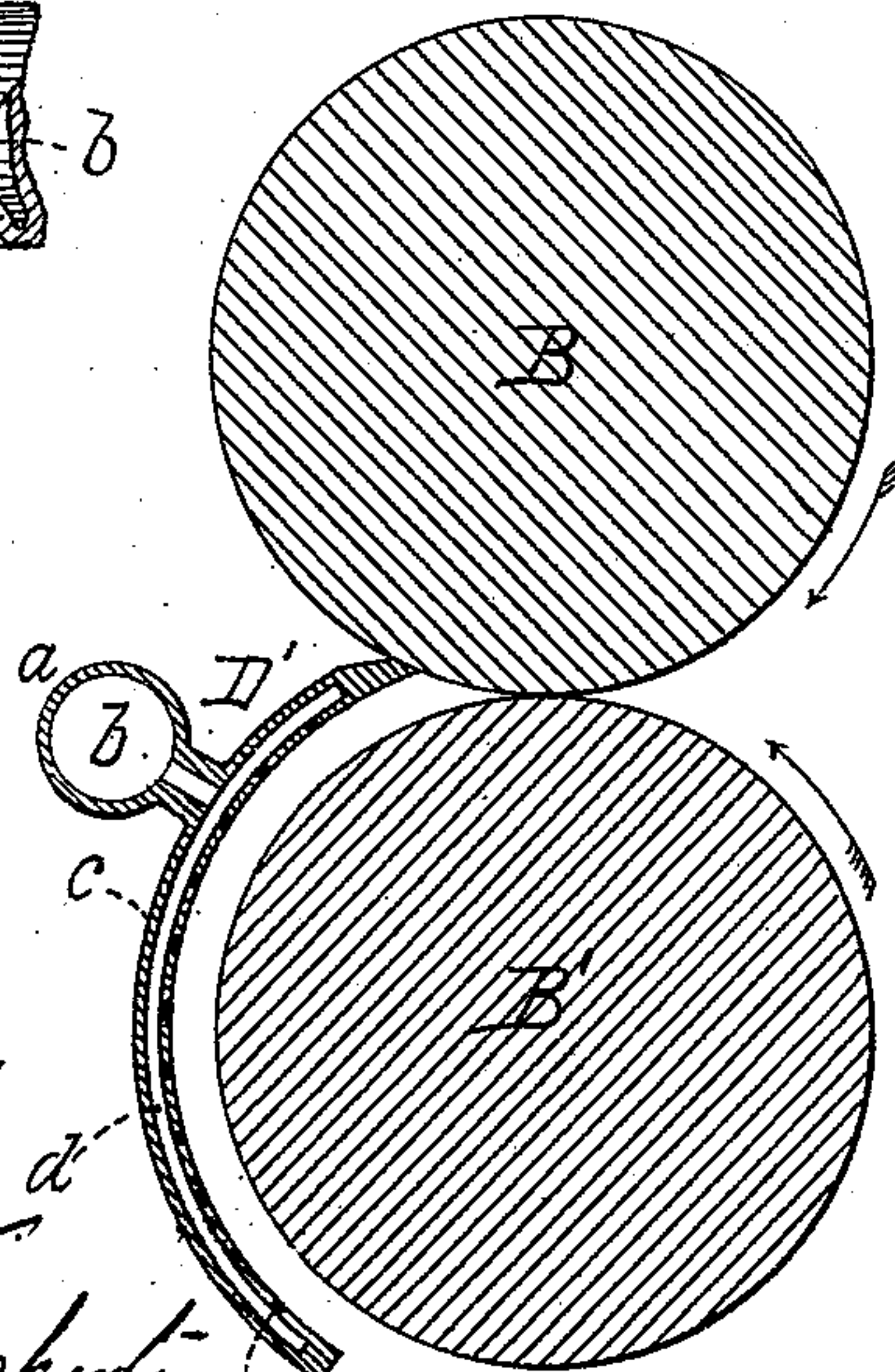


Fig. 6.

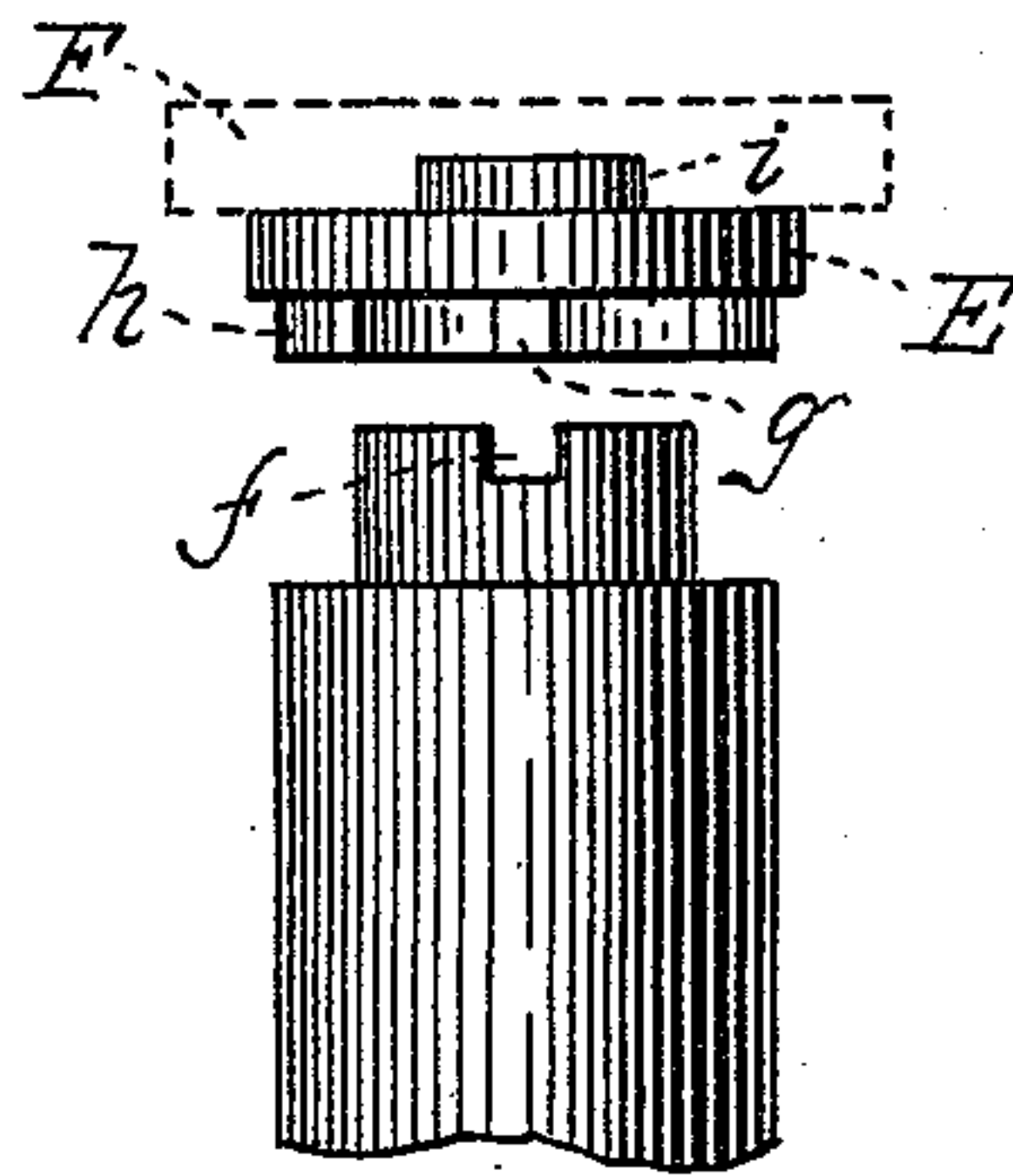


Fig. 5.

WITNESSES.

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INVENTOR.

Richard Smith,
by H. E. Lodge Atty.

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Fig. 7.

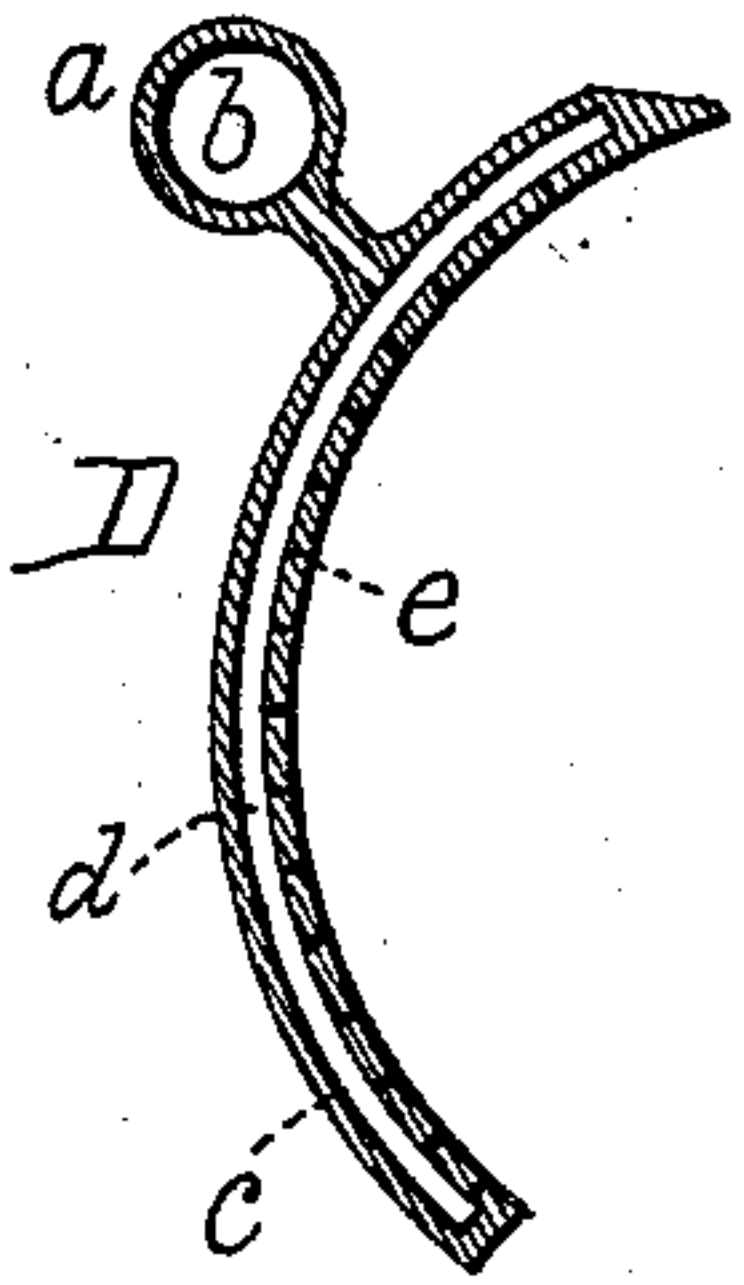


Fig. 8.

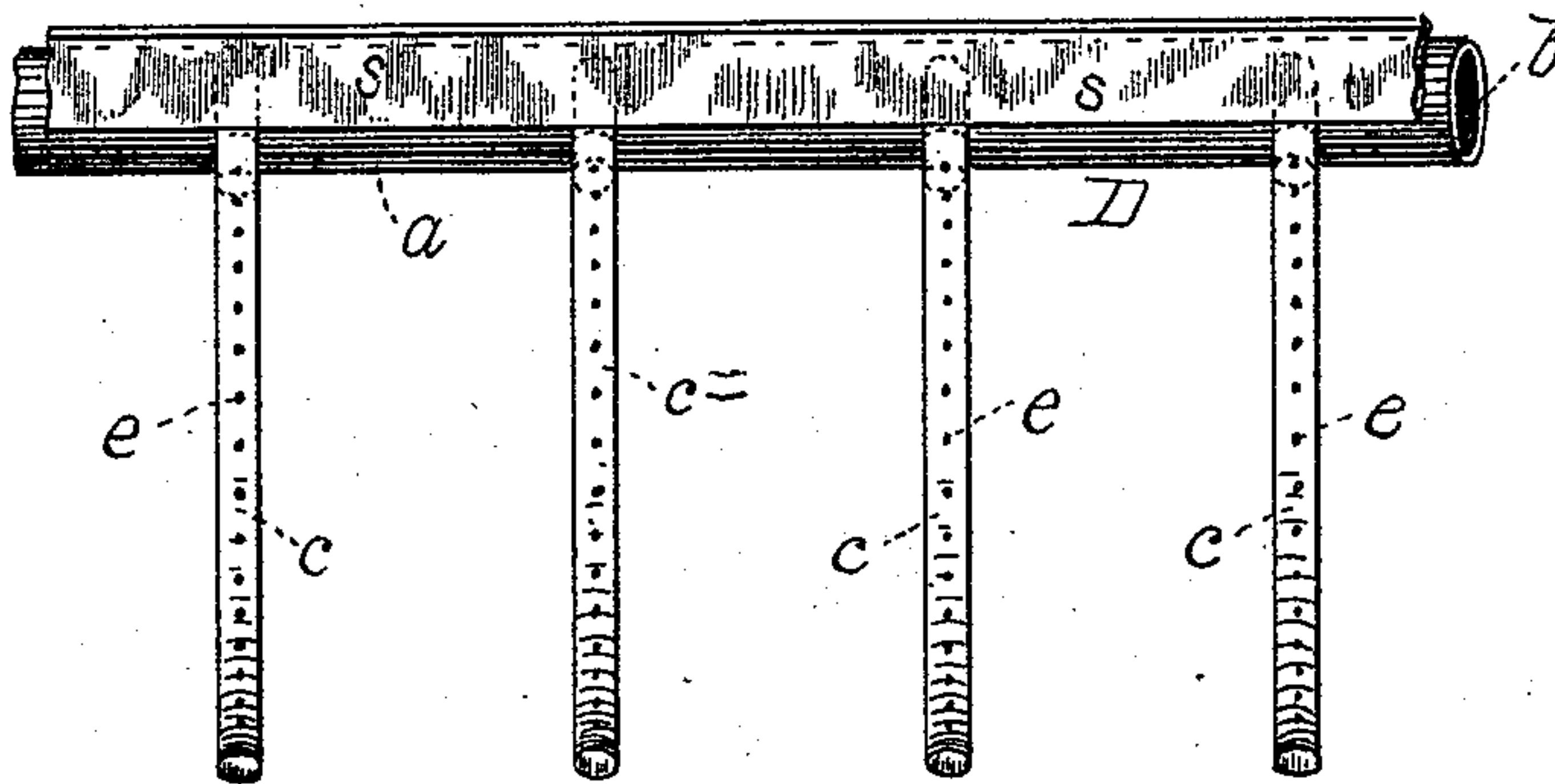
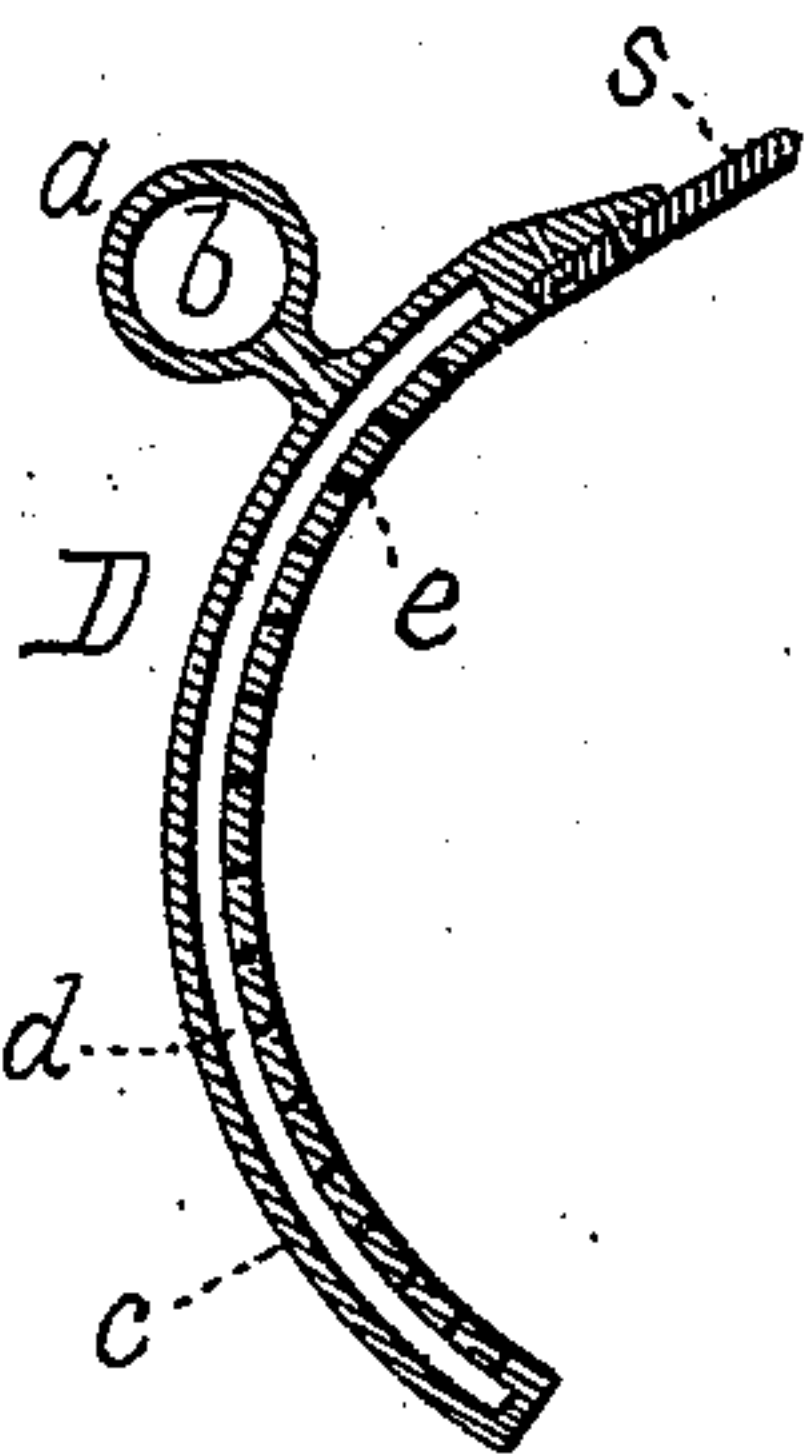
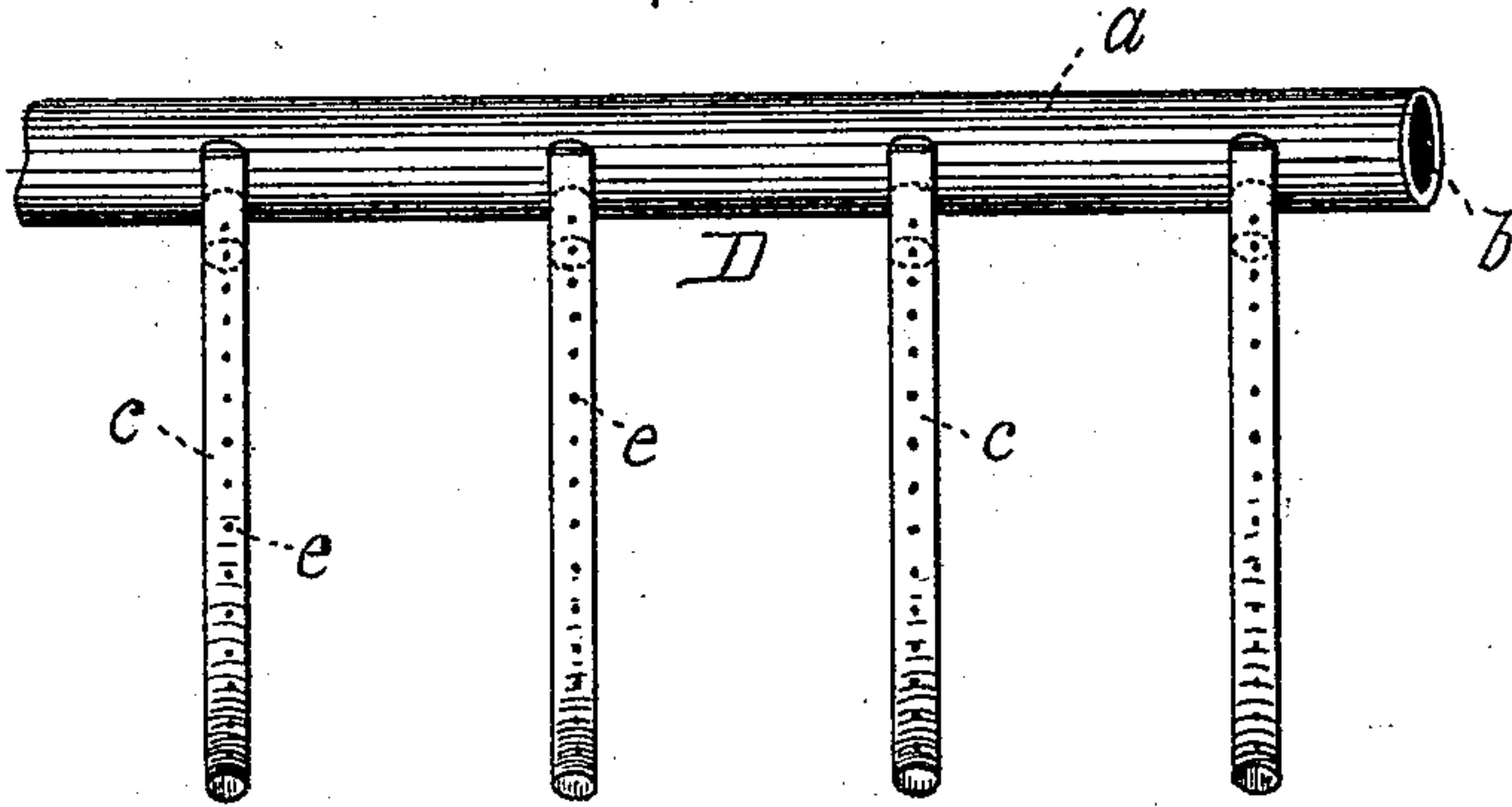
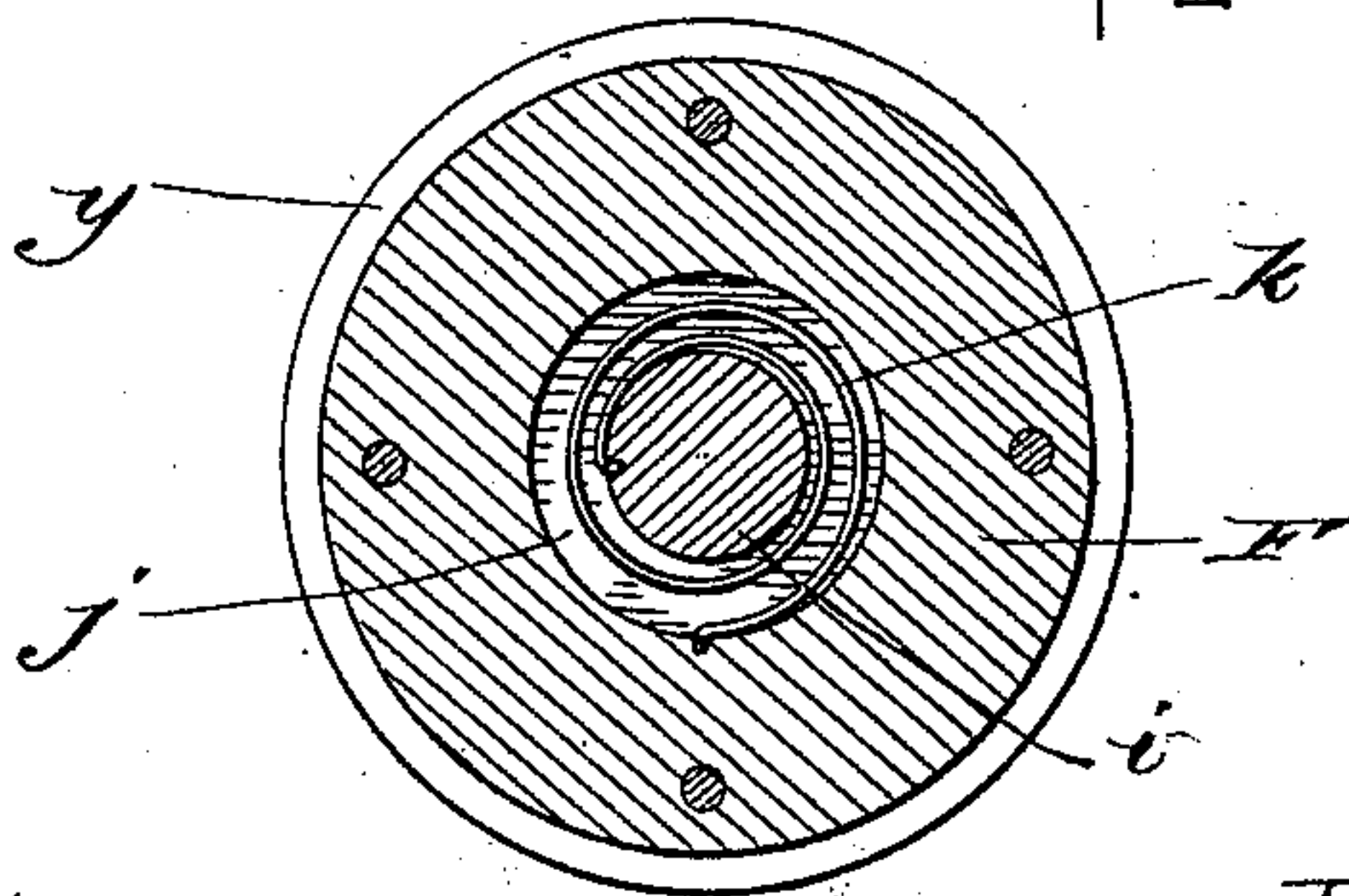


Fig. 9.

Fig. 11.

Fig. 10.



Witnesses.

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UNITED STATES PATENT OFFICE.

RICHARD SMITH, OF SHERBROOKE, CANADA.

DOCTOR FOR CALENDER-ROLLS.

SPECIFICATION forming part of Letters Patent No. 497,610, dated May 16, 1893.

Application filed August 3, 1891. Serial No. 401,501. (No model.)

To all whom it may concern:

Be it known that I, RICHARD SMITH, a citizen of the Dominion of Canada, residing at Sherbrooke, in the county of Sherbrooke and Province of Quebec, Canada, have invented certain new and useful Improvements in Doctors for Calender-Rolls; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

15 This invention relates to a pneumatic device for leading paper through calender rolls in the process of its manufacture, as it is delivered from the paper-making machine in a continuous web.

20 My invention may be considered as relating to, and an improvement upon that shown in the invention embodied in United States Letters Patent No. 327,031, issued in my name on the 29th day of September, 1885.

25 My invention in the present instance consists in improvements as indicated by the claims hereunto appended, in the construction of the doctors or shields, which are alternately disposed upon opposite sides of the several rolls composing the stack.

30 In carrying my invention into effect I provide a series of depending hollow fingers perforated on their inner faces throughout their lengths and attached to a hollow tube pivotally mounted in suitable bearings. This tube conveys the air to the depending hollow perforated fingers and as the air escapes through the apertures and impinges against the web of paper passing around a roll the paper is held by the air pressure against the surface of the roll about which it is now passing more closely than by the devices heretofore in use. Thus the paper is held against, and travels at the same rate of speed as the rolls, and less "broken" is made, since the web or sheet is prevented from doubling back or slipping as it frequently does. Hence this device is especially adapted for sheet-calenders or for super-calenders.

50 Other peculiar features of construction will be hereinafter more fully explained.

The drawings presented show in Figure 1, a vertical sectional elevation endwise of the

stack. Fig. 2 is a side elevation with a portion of one roll removed to show the perforated surface of the doctor fingers. Fig. 3 is a cross-section vertically through a doctor and its co-operating rolls enlarged. Fig. 4 is a sectional elevation of the journal of a doctor. Fig. 5 is an end view of the journal support and doctor. Fig. 6 is a plan of the journal support with end of doctor disengaged. Fig. 7 is a cross-section and Fig. 8 a front elevation of a doctor. Fig. 9 is a cross-section of a preferred construction of doctor, and Fig. 10 is a front elevation of the same. Fig. 11 is a vertical section on line $x-x$ of Fig. 4.

In said drawings A A' represent the housings in which are mounted a series of calender rolls B B' B² adapted to be suitably operated and forming part of a paper-making machine. In connection with these rolls is employed a series of doctors, or deflecting shields, which are employed as guides by which to automatically lead a continuous traveling endless paper web, or sheet, between and partially around each roll in a series of rapidly revolving rolls, which comprise the calender stack so called. In the present instance said doctors are shown as pivotally mounted upon the vertical portions of a wind, or air pipe system, shown at C C' or otherwise. Furthermore said doctors are reversely disposed upon opposite sides of each alternate roll in the stack, as shown, and said doctors are designated as D' D² D³ and partially inclose one roll, while they are in contact with the roll next above. Hence the paper, as it passes between two rolls is met by the doctor and deflected down about the partially inclosed side of one roll, and directed between the next two rolls where it is again guided by a second doctor, and so on through the stack.

The doctor embodying my invention comprises a tube a provided with an air passage b , said tube being of about the length of a roll, and preferably extending in a horizontal direction parallel with the roll and being pivotally mounted upon suitable supports. Each tube a communicates at one end with an air pipe C' and is closed at its opposite end which is supported on the pipe C which merely serves as a sustaining standard for one end of the tubes. These tubes are shown in Fig. 2 as being supported by plates F which are mounted on and suitably attached to collars y secured

to and embracing the pipe C, the tubes *a* having spring connections with the said plates F, as will hereinafter be described. Attached to said tube is a series of curved pendent fingers or deflectors *c* which inclose one side of the roll, (non-contiguous thereto,) and preferably are of a curvature concentric with that of the roll with which they co-operate. In my present improvements these fingers or guides are
 10 to be hollow plates, each to contain an air-duct *d*, while a series of openings *e* upon their inner faces and extending throughout their lengths permit the air current to impinge upon an extended surface of the roll. More-
 15 over these doctors are so mounted and arranged that the upper forwardly projecting ends of the guides are in contact with the roll next above that inclosed in part by said doctors.

20 These doctors are shown in Figs. 4, 5, 6, as spring-actuated, and are mounted and operated as follows: The closed end of the doctor is formed with a transverse slot *f*, which engages a corresponding rib *g* cast upon a bearing block E. The latter is further provided with a semi-annular rim *h* of a thickness to afford this end of the doctor a good support. By omitting the upper part of the rim the doctor can easily be removed from its bear-
 25 ings. The rear side of the block E is cast with a circular hub or boss *i*, which enters a recess *j* in a fixed plate F. This recess contains a coiled spring *k*, one end of which is to be attached to the boss *i* and this spring is so
 30 disposed that its tension shall be exerted to press the upper part of the doctor against its roll. It is to be understood that the plate F is a fixture, and may be bolted to the housings A A' or other suitable part of the stack.

40 In Figs. 7 and 8 the doctors are represented as composed of the main air tube *a* to which are affixed at regular intervals a series of curved pendent fingers as hereinbefore described. In such event the upper ends alone
 45 of said fingers are in contact with the surface of the roll.

In Figs. 9 and 10 I have shown a construction in which a straight thin steel bar *s* is attached to the upper extremities of said fin-
 50 gers. Thus the latter are strengthened and braced, while the bar rests for its entire length upon the surface of the roll. An obvious advantage in the use of this bar *s* is, that it prevents any small substance from
 55 sticking to the surface of the roll, and thereby injuring the paper. This might occur in the use of a doctor constructed as in Fig. 7, since the foreign particle might be located between two of the fingers and not being
 60 touched by them, would adhere to said roll and cause trouble.

The operation of this improved doctor is as follows assuming a doctor is in position: The endless web or sheet is directed between two
 65 rolls; as it emerges upon the other side it meets the doctor or shield, when it is deflected downward. But now in lieu of passing along

impelled merely by frictional contact with the surface of the roll, said paper is subjected to the pressure arising from the air escaping
 70 through the numerous apertures *e* in the fingers. Hence it is held snugly against the roll; no slip occurs and the result is that the paper passes along with a fair tension upon it. Thus less waste is incurred, when "mending
 75 up;" this is especially desirable in super-calendering.

What I claim is—

1. A deflector or doctor composed of a tube to which is attached a series of dependent
 80 hollow fingers perforated throughout their lengths upon their inner faces and provided with apertures opening into the said tube, combined with an air supply system whereby a flow of air may be directed outwardly and
 85 continuously through said fingers, substantially as and for the purposes set forth.

2. The combination with an air supply system and two revoluble rolls, one partially inclosed by but non-contiguous to, and the other
 90 in contact with a deflector or doctor, of a doctor pivotally mounted and composed of a tube, and a series of hollow fingers or guides attached to said tube and perforated throughout their lengths on their inner sides, sub-
 95 stantially as described.

3. In combination with a series of continuously revolving rolls, and an air supply system, the pivotal deflectors or doctors oppositely and serially disposed on either side of said
 100 rolls, said doctors alternating near the meeting surfaces of the rolls, and being each composed of a tubular back and a series of hollow fingers perforated throughout their lengths on their inner sides and being thus adapted to
 105 direct a continuous supply of air against that part of the roll inclosed, substantially as specified and described.

4. A doctor or deflector composed of a tubular back and a series of pendent hollow fin-
 110 gers provided with apertures or air openings throughout their lengths on their inner sides, combined with a straight bar secured to the upper extremities of each of said fingers and adapted to come in contact with a revoluble
 115 roll, and with an air supply system, substantially as and for the purposes herein described.

5. The combination with an air supply system and two revoluble rolls, B B', of a pivoted
 120 doctor composed of a tube provided with hollow perforated curved fingers *c* and an end slot *f*, the spring-actuated bearing E provided with a rib *g* to enter said slot, and a spring to operate the bearing and hold the doctor in
 125 contact with one of the rolls, substantially as stated.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD SMITH.

Witnesses:

H. E. LODGE,
 FRANCIS C. STANWOOD.