

No. 668,068.

Patented Feb. 12, 1901.

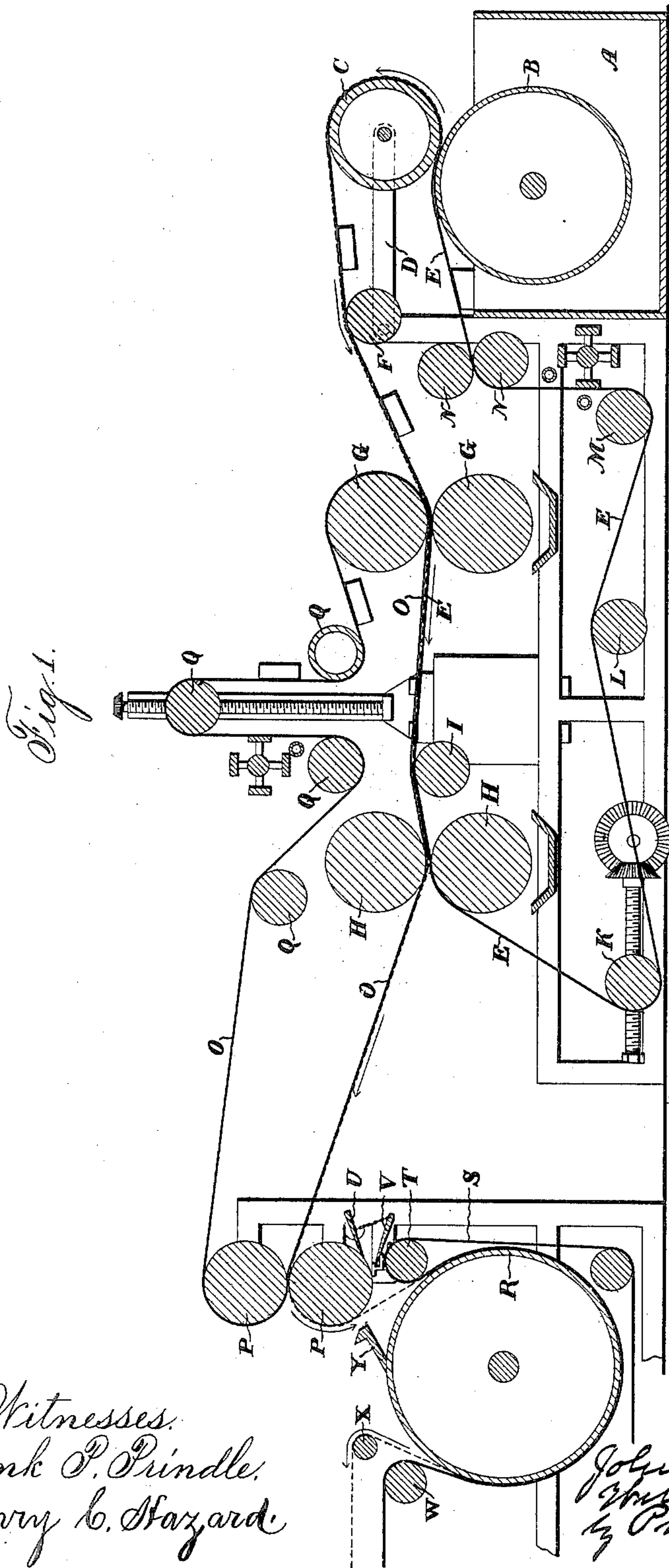
J. D. TOMPKINS & W. D. BARNES.

PAPER MAKING MACHINE.

(Application filed Dec. 9, 1897. Renewed Aug. 4, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
Frank P. Prindle,
Henry C. Hazard

Inventors:
John D. Tompkins
William D. Barnes
by Prindle & Russell
their attorney

J. D. TOMPKINS & W. D. BARNES.
PAPER MAKING MACHINE.

(Application filed Dec. 9, 1897. Renewed Aug. 4, 1900.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2.

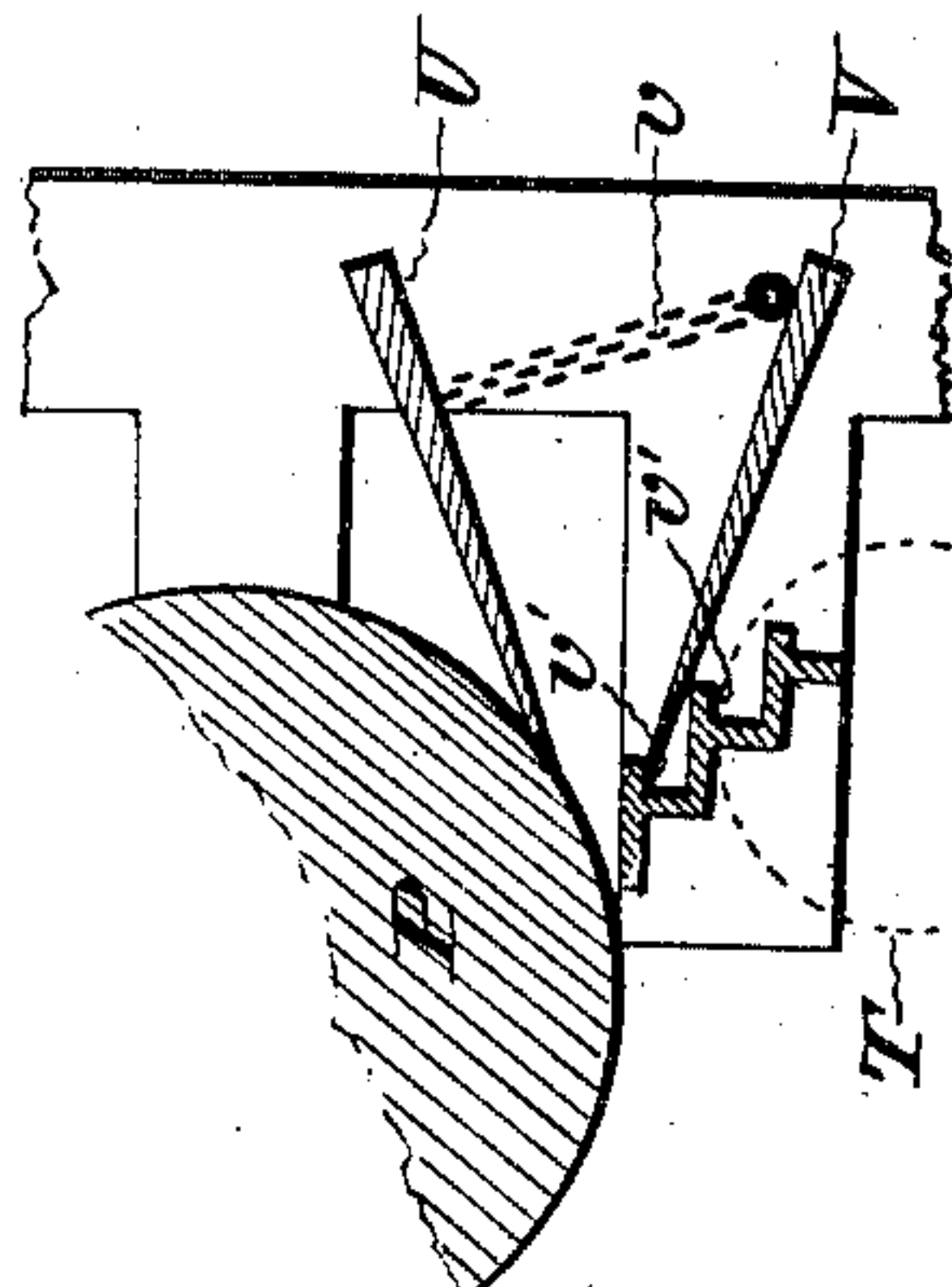
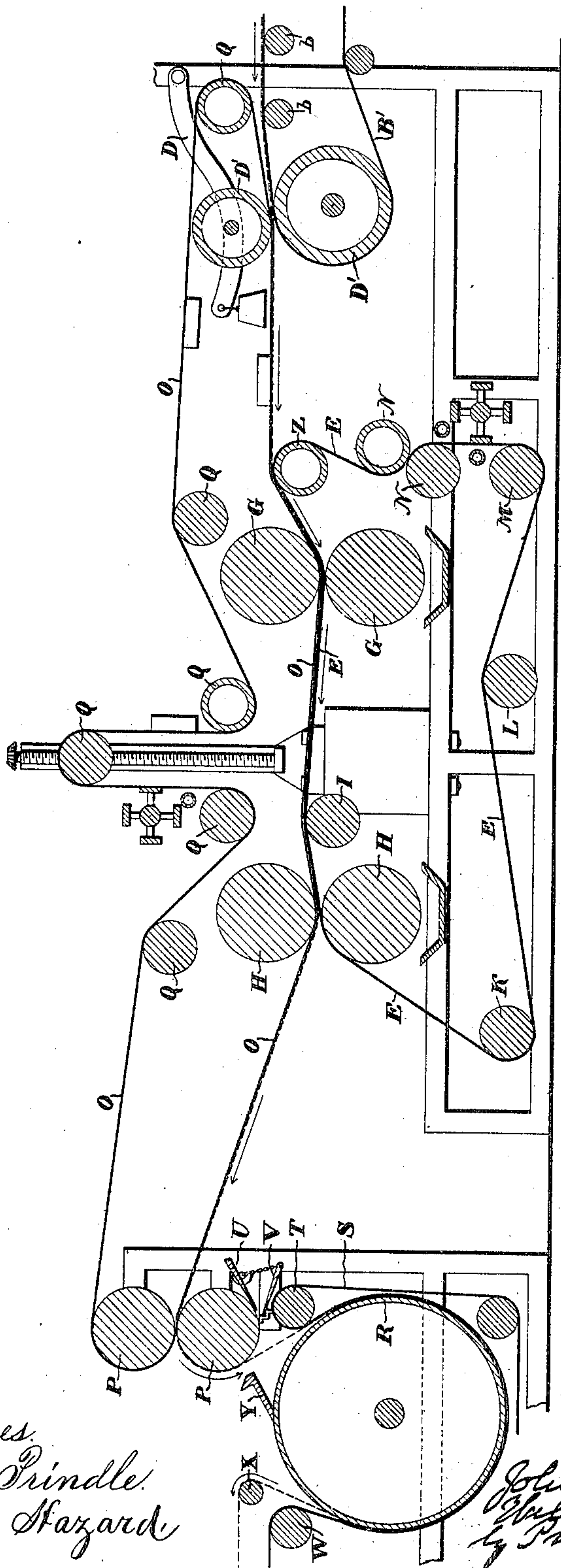


Fig. 3.

Witnesses.
Frank P. Prindle.
Henry L. Hazard

Inventors.
J. D. Tompkins
W. D. Barnes
by *Prindle & Hazard*
their Attorneys

UNITED STATES PATENT OFFICE.

JOHN D. TOMPKINS AND WILLIAM D. BARNES, OF BRAINARD, NEW YORK.

PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 668,068, dated February 12, 1901.

Application filed December 9, 1897. Renewed August 4, 1900. Serial No. 25,926. (No model.)

To all whom it may concern:

Be it known that we, JOHN D. TOMPKINS and WILLIAM D. BARNES, of Brainard, in the county of Rensselaer, and in the State of New York, have invented certain new and useful Improvements in Paper-Making Machines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a paper-making machine embodying our invention. Fig. 2 is a like view of a different type of machine in which our improvements are embodied, and Fig. 3 is a detail view of the adjustable protecting-plate of the drier-apron.

Letters of like name and kind refer to like parts in each of the figures.

The object of our invention is to provide certain improvements in paper-machines whereby the same may be rendered more efficient and capable of doing better work and with less manual labor or attendance; and to this end said invention consists in the machine having the features of construction substantially as hereinafter specified.

In the embodiment of our invention as shown in Fig. 1 a vat A to contain dilute pulp is employed, within which revolves a forming-cylinder B of usual construction, to the perforated or reticulated periphery of which a layer of pulp is caused to adhere by the exhausting of water from the interior of the cylinder. Above the cylinder B is placed a couch-roll C, mounted, as is common, in a swinging frame D, over which and over the top of the cylinder B passes an endless apron E, preferably made of felt, the apron thus passing between the cylinder and couch-roll. From the upper side of the latter the apron passes to and over an idler-roll F and thence in succession between two pairs of press-rolls G and G and H and H. An idler-roll I is placed at a suitable point between the two pairs of press-rolls, over which the apron passes. From the second pair of press-rolls the apron passes downward to and over a roller K, leaving which it passes in succession over rollers L and M, and from the latter, after passing vertically to and between a pair of squeeze-rolls N and N, it goes to the top of the

cylinder B. Also passing between both pairs of press-rolls G and G and H and H is a second apron O, of felt, like the apron E, which from between the second pair of rolls H and H, leaving the first apron E, runs between a pair of rolls P and P, arranged one above the other, and from the upper one of said rolls, after passing over a series of rolls Q and Q, runs to the top of the upper one of the first pair of press-rolls G and G, over which it passes to the bottom thereof, where it again meets the first apron E.

The pulp adhering to the periphery of the cylinder B is taken therefrom by the apron E and carried therewith around the couch-roll D to and between the two pairs of press-rolls G and G and H and H. In its passage between said rolls it is inclosed between the two aprons E and O, the former being below and the latter above it. As the apron O is the drier of the two, the pulp adheres to the under side of the same and travels with it and not the apron E, when the two separate after passing between the second pair of press-rolls H and H.

The two rolls P and P, to which the pulp adhering to the apron O passes, are separating-rolls to separate the sheet of pulp from the apron preparatory to passing said sheet to and around the drying-drum R, close to and above which said rolls are mounted. The lower roll P, preferably a naked iron one or small drier, being drier than the apron O takes the sheet from the latter, and it is carried by the revolution of the roll downward to the drier-apron S as the latter passes over the customary small roll T, placed close to the upper side of the drier-drum R, and by said apron carried to and held against the periphery of the drum. The rolls P and P while above the roll T are not directly over the same, but preferably are placed with their centers to one side of the center of the roll T.

A doctor U is provided to take the sheet from the under side of the lower roll P, that it may pass to the drier-apron S, as above described. Beneath said doctor and above the roll T is a plate V, that extends to a point beyond where the doctor engages the periphery of the roll P. Any moisture, fiber, specks, &c., adhering to the periphery of the roll and accumulating in front of the doctor and drop-

ping therefrom will be caught by said plate and thus prevented from falling onto the drier-apron as the same passes over the roll T and being thereby carried against the wet paper, to the damage thereof. The plate V preferably inclines downward from the roll P, and it has such width as to insure that matter falling or passing off of it will fall clear of the apron beneath. The plate V has the position and operates as described when the paper sheet is passing smoothly and continuously from the lower roll P to the drier-apron S. When, however, the sheet is broken, the position of said plate is changed, it being moved so that its inner edge instead of being in advance of that of the doctor shall be in rear thereof. Thus the end of the sheet as it is removed by the doctor may pass unhindered from the roll P downward to the drier-apron and carried to and over the drier-drum. The continuity of the sheet from the lower roll P to the drier being restored, the plate is given its former position. It will be understood that the continuity of the sheet being established the sheet will pass from the roll P at a point in advance of the doctor, which point is determined by the relative rates of speed of the roll and the drier-apron. To permit the said adjustments of the plate V, it may be supported in any suitable way, and any preferred means may be employed to secure it in its adjusted positions. As shown, said plate is suspended by a chain *v*, attached to its outer edge, and has its inner edge at each side engaged with one of a series of lugs or teeth *v'* and *v'* on the inner side of the supporting-frame. The weight of the plate is utilized to hold it in engagement with the desired lug or tooth by arranging the chain so that it stands out of the vertical, so as to cause the plate to have a tendency to move in a direction toward the lug or tooth. From the drier-drum the apron S passes to a roll W, similar to the roll T, while the sheet of paper passes to a roll X, placed above the roll W. To prevent the sheet from adhering to and winding about the drum in quantities difficult of and involving loss of time and labor in its removal, we employ a doctor Y to intercept the paper on the periphery of the drum at a point in advance of the point where it first touches the drum, thus preventing its complete circuit of the drum. Said doctor has such size as to hold an accumulation of wet paper until it can be carried over the remainder of the machine.

It will be apparent that in passing through both pairs of press-rolls the sheet of pulp is protected on both sides by the two aprons, the rolls thus not coming in direct contact with the sheet, and that the water or liquid expressed from the pulp by said rolls passes through the under apron only, and as the latter apron only accompanies the pulp from the forming-roll B the upper apron is kept relatively less saturated and is less impregnated

with foreign matter, and is thus in good condition to perform its important function of carrier of the sheet from the last press-rolls to the drier. The importance of this last-named feature of our machine will be obvious. The transfer of the forward end of the sheet of pulp from the press to the drier does not require manual labor, being done automatically, and the sheet being supported by the apron is not in danger of injury, as an unsupported sheet is, from the tension or strain to which it is necessarily subjected. As the separating-rolls P and P are located above the point at which the sheet is to be delivered to the drier-apron, the end of the sheet passes from the lower separating-roll to said apron by gravity, requiring no manual intervention. Then the employment of the rolls P and P instead of running the second apron O directly to and upon the drier-drum with the paper sheet is important. It enables the drier-drum and the sheet to be run at relatively different speeds, which under certain circumstances may be necessary, and it enables the economical use of the heat, for if the wet apron O were carried to the drum heat to evaporate the water in it would be required in addition to that needed to dry the sheet of paper. The position of the roll T is such relative to the point where the sheet is removed from the roll P by the doctor U that the end of the sheet is carried slightly forward and supported by the apron S until the sheet is carried and firmly held in contact with the hot surface of the drum. Thus danger of wrinkling the sheet is prevented.

For the cleansing and the removal of water from the aprons E and O the customary devices of beaters or whippers, shower-pipes, and suction boxes or rolls are provided at suitable points, as shown. The suction boxes or rolls, whose function is to remove foreign matter from the aprons, are placed at the paper-receiving sides thereof, so as to draw the matter toward and from the surface at which they entered instead of the opposite surface.

The second pair of press-rolls may be driven by power applied to them, as usual; but the revolution of the first pair of press-rolls and the separating-rolls is preferably effected by means of the aprons E and O, supplemented by power applied frictionally through belts and pulleys to the journals of the rolls, and preferably only to the journals of the lower rolls of the two pairs. We of course do not restrict the scope of our invention to these particulars, as they may be varied or departed from without departure from our invention.

We show and describe two pairs of press-rolls; but one or more than two can be employed, if desirable. When two or more pairs are employed and it is desired to operate at a high rate of speed or if a large amount of water is to be expressed from the

pulp, the several sets of rolls are adjusted so as to have the amount of water to be expressed through the lower apron divided among them, such a procedure being easier on the aprons and with less danger of parting the felted fibers of the paper-pulp than when excessive pressure is applied to cause the water to be removed by the operation of one pair of rolls.

10 In the embodiment of our invention illustrated in Fig. 2 instead of the cylinder-former B there is employed a former that consists of an endless wire-cloth B', that after passing over a series of small rolls *b* and *b* passes between couch-rolls D' and D', and instead of 15 the lower apron E being the one to take the sheet of pulp from the former the upper apron O is lengthened to run between said rolls, receiving the pulp on its under side. The lower 20 apron E after passing between the squeeze-rolls N and N runs first to a small roll Z and then to the first pair of press-rolls.

It has not been deemed necessary to show except in a general way the frames for supporting the various parts of the machine, as those skilled in the art can readily supply the same.

Having thus described our invention, what we claim is—

30 1. In a paper-making machine, the combination of a former, an apron extending to and taking pulp from the same, a succession of liquid-expressing devices through which said apron passes, a second apron also passing 35 through said devices, but not extending to the former, said second apron being passed through the expressing devices on the side of the pulp opposite that toward which the liquid is expressed, and a drier mechanism to 40 which said second apron passes, substantially as and for the purpose described.

2. In a paper-making machine, the combination of a former, liquid-expressing mechanism, a drier mechanism, and a pulp-carrier 45 extending from the expressing mechanism to a point over the drier mechanism, and delivering the pulp to the upper side of the latter, substantially as and for the purpose described.

50 3. In a paper-making machine, the combination of a former, a drier mechanism, a pulp-carrying apron extending to a point over the drier mechanism, and means for taking the pulp from the apron and delivering it to the 55 upper side of the drier mechanism, substantially as and for the purpose described.

4. In a paper-making machine, the combination of a former, a drier mechanism, a pulp-carrying apron, and rolls between which the 60 apron and pulp pass, located over the drier mechanism from which the pulp descends to

the latter, substantially as and for the purpose described.

5. In a paper-making machine, the combination of a former, a drier mechanism, a pulp-carrying apron, rolls between which the apron and pulp pass, located over the drier mechanism, to one of which the pulp adheres, and a doctor to act on said roll, substantially as and for the purpose described. 65 70

6. In a paper-making machine, the combination of a former, liquid-expressing mechanism, a pulp-carrying apron extending from the expressing mechanism to the drier mechanism, and rolls at the latter between which 75 apron and pulp pass, to separate them and deliver the pulp to the drier mechanism, substantially as and for the purpose described.

7. In a paper-making machine, the combination of a former, an endless apron taking 80 pulp therefrom, press-rolls between which said apron passes from said former, other rolls leading said apron back to said former, a second apron also passing between the press-rolls, a drier mechanism to which the pulp is 85 taken by said second apron, and separating-rolls adjacent to the drier mechanism, between which said apron and the pulp pass, and delivering the pulp to the drier mechanism, substantially as and for the purpose de- 90 scribed.

8. In a paper-making machine, the combination of forming and press mechanism, a pulp-carrying apron, a drier mechanism, separating-rolls over the drier mechanism be- 95 tween which the apron and pulp pass, a doctor for one of said rolls, and a plate interposed between the doctor and the drier mechanism, substantially as and for the purpose set forth. 100

9. In a paper-making machine, the combination of a pulp-carrying roll, a doctor, a part to which pulp is delivered from the roll, and an adjustable plate interposed between the doctor and said part, substantially as and for 105 the purpose described.

10. In a paper-making machine, the combination of a pulp-carrying roll, a doctor, an apron traveling below the doctor to which the pulp is delivered from the roll, and a plate 110 interposed between the doctor and the apron, substantially as and for the purpose described.

In testimony that we claim the foregoing we have hereunto set our hands this 20th day 115 of November, A. D. 1897.

JOHN D. TOMPKINS.
WILLIAM D. BARNES.

Witnesses:

EDWARD G. AMES,
ELIZA AMES.