J. HATCH.

Paper-Making Machine.

No. 206,107. Patented July 16, 1878.

Fig. 1.

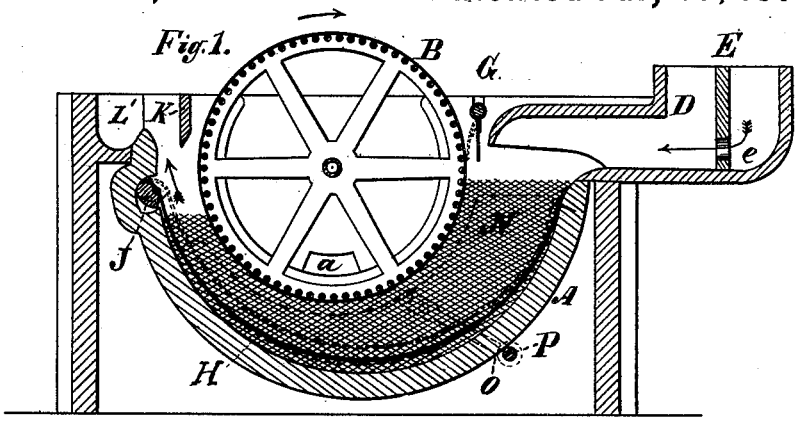


Fig. 2.

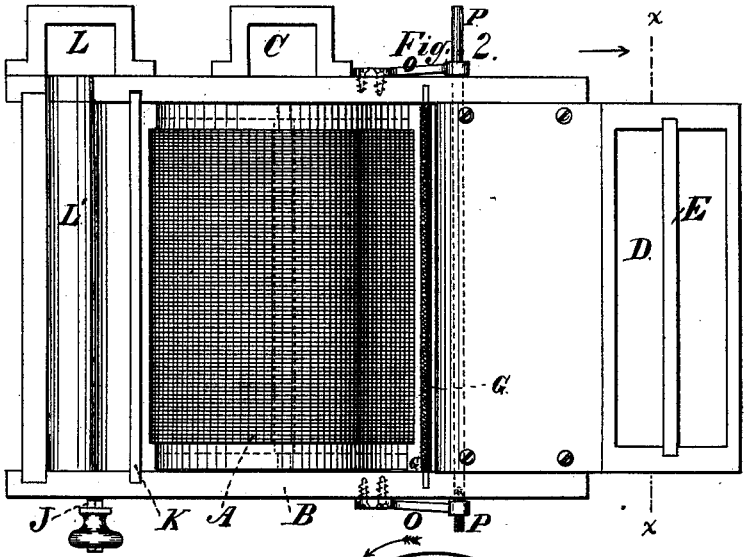
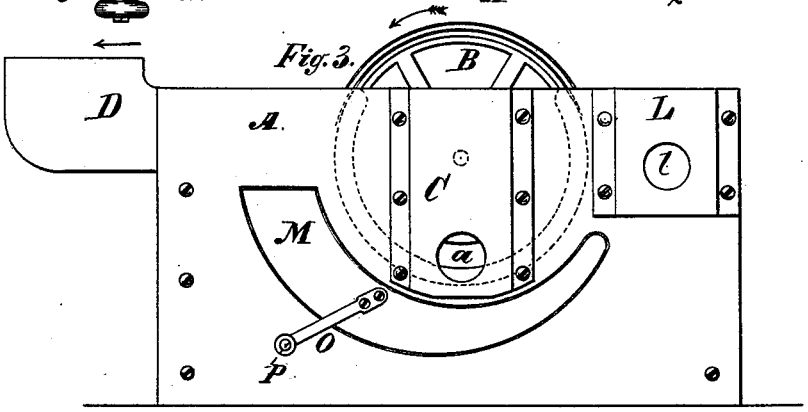


Fig. 3.



Witnesses:

Henry Eichling.

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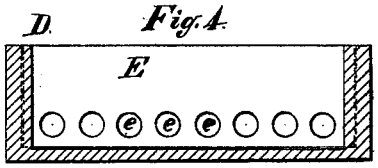
Fig. 4.



Inventor

Jonathan Hatch

By

Brown & Allen

Attys

UNITED STATES PATENT OFFICE.

JONATHAN HATCH, OF SOUTH WINDHAM, CONNECTICUT, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE HATCH, OF SAME PLACE.

IMPROVEMENT IN PAPER-MAKING MACHINES.

Specification forming part of Letters Patent No. **206,107**, dated July 16, 1878; application filed January 12, 1878.

To all whom it may concern:

Be it known that I, JONATHAN HATCH, of South Windham, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Paper-Making Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, sufficient to enable those skilled in the art to which my invention relates to make and use the same.

My invention relates to that class of paper-making machines which are known as "cylinder-machines." In such machines, as heretofore constructed, it has been found difficult to produce paper equally strong in all directions, in consequence of the tendency of the fibers in the pulp to arrange themselves in a uniform direction, which tendency is caused by the rotation of the cylinder on which the pulp is deposited and the action of the water in which the cylinder rotates. To prevent this tendency of the fibers to arrange themselves in one direction, means have been employed for the production of a current through the vat, with a view to produce what has been termed a "state of rest" relatively between the surface of the cylinder and the pulp and water in the vat; but the means employed for producing the current have not been effective, owing to practical difficulties met with in the application of a current to the purpose specified.

To obviate these and other difficulties in this class of machines is the object of my invention.

The invention consists in the employment of novel means for producing a head for the purpose of maintaining a current through the vat containing the pulp and water, said current traveling in the direction of the revolution of the cylinder, and at a corresponding velocity therewith; and it also consists in a novel means for insuring the uniformity of the velocity of said current, and for regulating said velocity to correspond with that of the cylinder in its revolution.

The invention consists, further, in a novel construction and arrangement of devices for delivering the pulp and water to the vat, for preventing the depositing of pulp on the cylinder above the proper level, and for preventing the web of pulp from being improperly drawn away from the cylinder.

The invention also consists in means for preventing the pulp fibers from depositing endwise upon the cylinder.

The accompanying drawings illustrate a cylinder paper-making machine constructed in accordance with my invention.

Figure 1 is a longitudinal vertical sectional view of such a machine. Fig. 2 is a top view of the same. Fig. 3 is a side view of the machine in a reverse position to that shown in Fig. 1. Fig. 4 is a transverse vertical section taken in line *x x* of Fig. 2.

The vat A and cylinder B are of the usual or any suitable description. The cylinder is packed at both ends with ribbon packing, in the same manner as in machines in common use, and the water is exhausted from the cylinder, in the usual manner, through an opening, *a*, in the side of the vat communicating with a compartment, C, arranged on the outside of the vat.

D is a pulp and water receiving box, placed higher than the general level of the pulp and water in the vat, and which is provided with a septum or partition, E, containing perforations *e*, as shown in Fig. 4. By means of this perforated partition the box D is divided into two compartments. The pulp and water are received in the compartment farthest from the cylinder, and thence pass through the perforations in the septum E before reaching the vat. By this means the pulp is uniformly delivered to the vat and cylinder throughout the entire width of the vat, and inequality of thickness in the paper is avoided. This arrangement and construction of parts enable me to maintain a current through the vat without the use of any mechanical appliances in the vat itself, which is needful in order to make way for other devices (hereinafter described) for obtaining uniformity in the velocity of the current throughout its entire extent, without which uniformity a uniform web cannot be deposited upon the cylinder.

Between the cylinder B and the mouth of the box D is an apron, G, extending the entire width of the vat. This apron is composed of flexible and fibrous or other suitable material, and is suspended from a rod or bar, the ends of which rest in bearings in the sides of the vat at or near their upper edges. The

apron extends down slightly below the level of the mouth of the box D, and, being drawn against the cylinder, as shown in Fig. 1 in dotted outline, prevents the depositing of pulp, and the consequent formation of paper, upon the portion of the surface of the cylinder which has not yet reached the current passing through the vat. By this means I prevent imperfection in the paper by the depositing of pulp fibers on that part of said cylinder which has not entered the current in the vat.

The cylinder B is arranged eccentrically with relation to the semicircular bottom of the vat, so that the space or channel between the surface of the cylinder and the bottom of the vat grows gradually and regularly narrower from one end of said space to the other, being considerably narrower at the part where the cylinder emerges from the pulp than at the part where it enters the same during its revolution.

The object of this arrangement is to cause the current in the pulp-vat to move with equal and uniform velocity in all parts of the vat, instead of diminishing in velocity on account of the passage of water through the cylinder, as would be the case were the said channel of equal size throughout.

To still further insure this result, and also to regulate the current to correspond with the velocity of the cylinder, the blanket H is employed. This blanket is of corresponding width with the vat and cylinder, and of a length about equal to that of the concave bottom of the vat. One end of the blanket is secured to the vat immediately under the mouth of the box D, and the other end is attached to an eccentric-roller, J, arranged in bearings near the opposite end of the concave portion of the vat, and near the narrowest portion of the channel between the cylinder and vat.

When desired, the blanket may be allowed to lie parallel with or closely against the concave portion of the vat; but by turning the roller J in the direction indicated by the arrow the eccentricity of the channel is increased—that is to say, the space between the cylinder and the blanket is made to taper more abruptly, and the outlet of the channel is made still narrower. By this means the regularity and uniformity of the current are insured, and its velocity may be regulated to correspond with that of the cylinder.

The transfer of pulp and water passing through the vat from end to end of said vat is produced by means of a pump of any suitable description, arranged in connection with a pipe, tube, or conduit extending to the box D from an opening, *l*, in a compartment, L, located near the opposite end of the vat from said box D. The compartment L communicates directly with a transverse channel or trough, L′. The front edge of the trough L′ is considerably lower than the top of the box D, and the level of the pulp and water in said box is higher than at the opposite end of the vat, because said box not only receives the pulp pumped back from the channel L′, but also constantly receives as much pulp and water as has been extracted by the action of the cylinder and pump connected with said cylinder, the result of which is the production of a head of pulp and water in the box D, by which means the current is maintained through the vat in the direction in which the cylinder revolves.

As the cylinder emerges from the vat coated with a web of pulp, the tendency of the current is to draw said web away from the cylinder in a direction toward the channel L′. To prevent this I employ a partition or dividing-bar, K, having preferably a thin lower edge, arranged in a vertical position, and extending from one side of the vat to the other, at a point between the emerging portion of the cylinder and that part of the vat toward the said channel. By means of this partition or bar the current is divided, a portion going toward the outlet-compartment L, and the portion between the dividing-bar K and the cylinder comes to rest. The web is thus prevented from being drawn away from the cylinder.

To prevent, as far as possible, any of the pulp fibers from depositing endwise upon the cylinder, which would weaken the paper, I not only produce in the vat the hereinbefore-described current, but I also oscillate the water and pulp laterally in the vat.

I accomplish this by the following means: Instead of making the sides of the vat continuous, I fit in opposite sides thereof, below the bearing of the cylinder B, movable tapering curved pieces M, one of which is shown in full outline in Fig. 3, and the other of which is shown in dotted outline in Fig. 1. Each of these pieces is held in position, and is attached to the side of the vat by a flexible piece, N, of canvas, rubber, or other suitable flexible material, preferably attached to the inner side of the vat. From the outer side of each piece N projects an arm, O. Said arms are connected by a cross-bar, P, which passes through under the semicircular bottom of the vat A. To the cross-bar P, I apply power for reciprocating the same, and to oscillate the tapering curved pieces M through short distances back and forth, thereby causing a lateral oscillation of the pulp and water in the vat, which produces the same result on the pulp fibers that is produced in the Fourdrinier machine by the lateral to-and-fro motion of the wire web—that is to say, it insures the flat lying of each fiber of the pulp.

By these means I am able to obtain the required lateral oscillation of the pulp at right angles with the direction of the rotation of the cylinder in a much more simple manner than it has heretofore been obtained, and to avoid complications involved in oscillating the rotating cylinder relatively to the vat. The parts to be moved are lighter, and friction is much reduced; hence less power is required

to operate the machine, as when the vat is itself oscillated the entire weight of the vat and its contents rests upon the bearings which support the vat, which produces great friction.

By these means I am able to produce, in a cylinder paper-making machine, a paper in which the fibers lie flat and cross indifferently in all directions, and which is consequently of equal strength in all directions—a result hitherto unattained in this class of paper-making machines.

I do not, however, confine myself to any particular form for the movable oscillating pieces M, to any precise method of attaching them to the sides of the vat, or to the precise means of connecting them herein described. Neither do I confine myself to the precise means for maintaining a head in the receiver of pulp and water; but, while disclaiming the production of a current through the vat, broadly, I reserve to myself the use of any means for the production of a head which shall produce such a current through said vat.

I claim as new and desire to secure by Letters Patent—

1. The combination, in a cylinder paper-making machine, with the vat and cylinder of the same, of a receiver of water and pulp, higher than the general level of the pulp and water in the vat, in which a head is maintained for maintaining a current in the direction in which the cylinder revolves, substantially as and for the purpose set forth.

2. The combination of the blanket K and eccentric-roller J, for producing uniform velocity of current and regulating the velocity thereof, substantially as herein described.

3. The combination, with the pulp and water receiving box D, of the perforated septum or partition E, for distributing the pulp equally to the cylinder, substantially as and for the purpose set forth.

4. The combination, with the vat A and cylinder B, of the apron G, for preventing the deposit of pulp and formation of paper on the cylinder before entering the current, substantially as herein described.

5. The combination, with the vat A and cylinder B, of the partition or dividing-bar K, for preventing the drawing of the web from the emerging portion of the cylinder, substantially as herein described.

6. The combination, with the vat of a cylinder paper-making machine, of one or more oscillating pieces in the sides of said vat, for producing lateral to-and-fro motion of the water and pulp in said vat, substantially as and for the purpose specified.

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Witnesses:
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