3 Sheets—Sheet 1.

J. HATCH.

Cylinder Paper-Making Machine.

No. 206,106. **Patented July 16, 1878.**

Fig. 1.

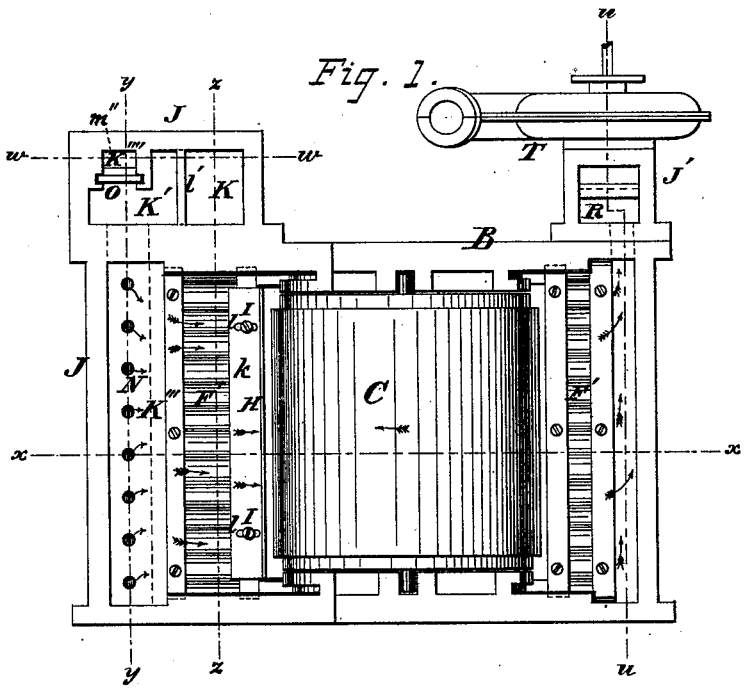
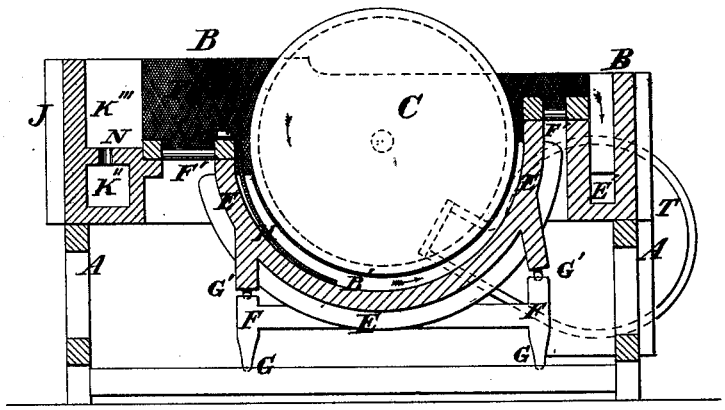


Fig. 2.



WITNESSES,
Fred. Haynes
L. Allen

INVENTOR,
Jonathan Hatch
by his Attorneys
Brown & Allen

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Fig. 3.

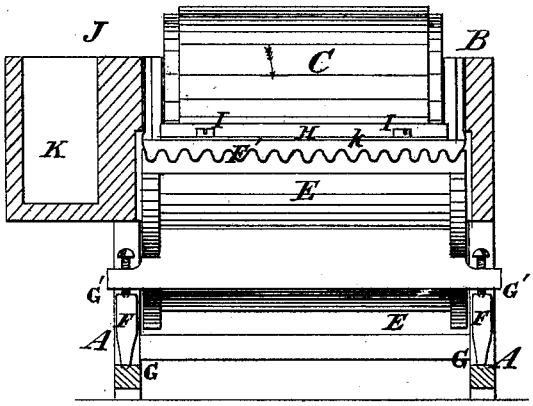

Fig. 4.

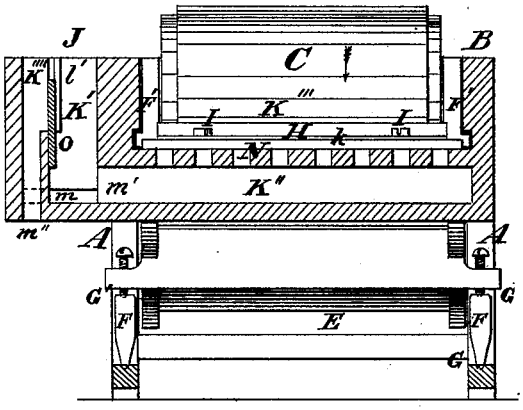

Fig. 5.

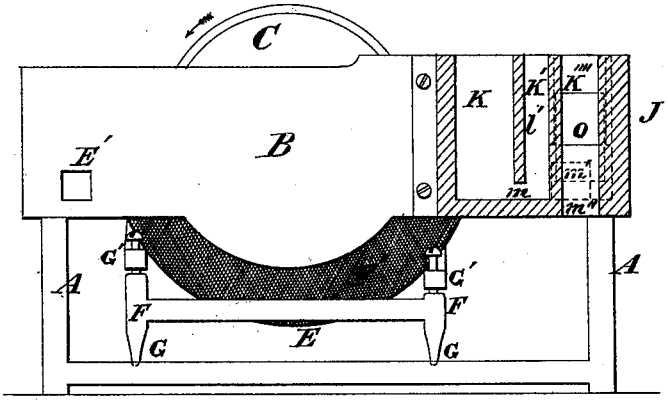

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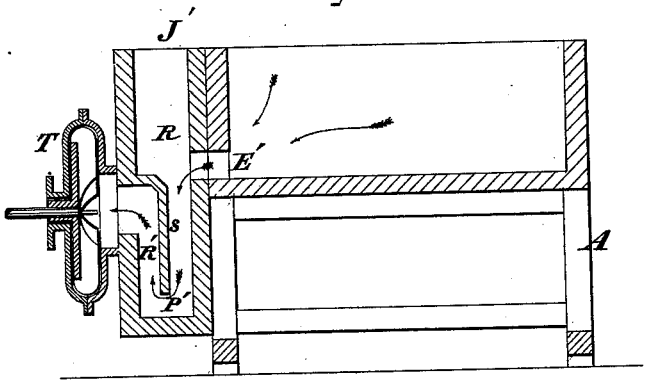
Fig. 6.



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UNITED STATES PATENT OFFICE.

JONATHAN HATCH, OF SOUTH WINDHAM, CONNECTICUT.

IMPROVEMENT IN CYLINDER PAPER-MAKING MACHINES.

Specification forming part of Letters Patent No. **206,106**, dated July 16, 1878; application filed June 19, 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 an Improvement in Cylinder Paper-Making Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improvement on a cylinder paper-making machine for which Letters Patent were allowed to me on the 14th of February, 1878, filed January 12, 1878.

The said machine was constructed on the principle of making the commingled water and pulp flow in the same direction as that of the rotation of the cylinder, and at the same velocity in all parts of the channel between the cylinder and the bottom of the vat as that of the periphery of the cylinder, thus keeping the said pulp and water relatively at rest with the said periphery, and causing the pulp to deposit upon the cylinder with its fibers lying indefinitely in all directions, instead of lying principally or wholly in one direction, as has hitherto been the case with the old style of cylinder paper-making machines. The method employed in the said machine for generating a current of the pulp and water in the direction specified was a pulp and water receiving box, placed higher than the general level of the pulp and water in the vat, whereby a head is maintained in the said box on that side of the cylinder from which the said pulp and water flows toward the other side, by which means complications and difficulties heretofore met with in applying the aforesaid principle to such machines were obviated.

My present invention has for its object the further improvement of this class of machines, and the removal of certain practical difficulties met with in carrying the aforesaid invention into practice.

In the invention described in my former application (allowed on the 14th of February, 1878) the vat was formed with oscillating side pieces in the sides of the vat, for the purpose of imparting a lateral motion to the pulp and water in the vat, in order to more fully secure the depositing of the pulp on the cylinder in all directions.

Practical difficulties found in the application of the aforesaid side pieces have suggested one feature of my present invention, which consists in an oscillating bottom of the vat in connection with the aforesaid oscillating side-pieces, both the said side pieces and the bottom of the vat oscillating together, as hereinafter described.

Another feature of my present invention consists in the combination, with the aforesaid oscillating bottom of the vat and the attached side pieces, of rocking or oscillating supports, by which objectionable friction, otherwise met with, is effectually reduced within a practicable limit.

A third feature of the invention is the attachment of the aforesaid oscillating bottom and side pieces to the stationary part of the vat by means of a flexible connector of elastic or corrugated material, by which means the said oscillating bottom and attached side pieces are permitted to move together without danger of tearing, cracking, or rupturing the said connector, and whereby leakage from the vat through the junctions of the said bottom and side pieces is prevented.

A fourth feature of the invention is an adjustable regulating-plate for regulating the sectional dimensions of parts of the channel between the said cylinder and the said movable bottom, which is a substitute for the blanket or apron and eccentric or cam-roller employed in my former invention for regulating the sectional dimensions of parts of the channel between the said cylinder and the said bottom, the bottom of the vat in the former invention being fixed. This feature obviates difficulties met with in the practical application of the aforesaid blanket or apron.

A fifth feature of the invention is a receiving-box, divided into compartments, one for the inflow of the pulp, water, and size to the vat, and the others for separating the froth from the same, the said compartments communicating with each other by passages, a gate for regulating the head in the machine, as hereinafter described, being connected with the said box.

A sixth feature of the invention consists in a divided box for receiving the overflow of the water and size, with whatever pulp may be contained therein, said box connecting the dis-

charge-outlet for the said overflow with the pump, through the agency of which the said water and size and the contained pulp are carried back to the receiving-box for the same, and by which means I am enabled to feed back to the vat solid water, pulp, and size, instead of the froth of the same, and therefore secure a very much better result than could be obtained without the said box connecting the aforesaid discharge-outlet with the pump.

Figure 1 in the drawing is a top view of a cylinder paper-making machine constructed in accordance with my invention. Fig. 2 is a vertical section through the same made on the line *x x* in Fig. 1. Fig. 3 is a vertical section of the same made on the line *z z* in Fig. 1. Fig. 4 is a vertical section made on the line *y y* in Fig. 1. Fig. 5 is a vertical section made the line *w w* in Fig. 1. Fig. 6 is a section made on the line *u u* in Fig. 1.

A in the drawing represents the frame, which supports all the working parts of the machine. B represents the stationary part of the vat, and C the cylinder. The direction of the rotation of the cylinder in the said vat is indicated by arrows, as is also the direction of the current of mixed pulp and water in the channel between the cylinder and the bottom of the vat.

J is the pulp and water receiving box, and E′, Fig. 6, represents the discharge-outlet, from which water and size, with some commingled pulp, overflow, to be carried back to the said box, as hereinafter described. As described in my former application above referred to, the said pulp and water receiving box J is placed higher than the general level of the pulp and water in the vat, in order to create a head that shall cause a current to flow in the direction of the rotation of the cylinder with a velocity in its several parts equal to the velocity of the periphery of the said cylinder as far as it is practicable to attain the said velocity. The constant velocity in the said channel is obtained, as heretofore, by the contraction of the said channel as it progresses from the receiving-box to the overflow; but, as a further means of adjusting the sectional area of the said channel in its different parts, I employ an adjustable regulating-plate, hereinafter described.

To obtain a lateral movement of the pulp and water in the aforesaid channel relatively to the direction of the rotation of the cylinder C, I employ a vat having a movable bottom, E, attached to curved side pieces B′, Fig. 2, which may be made to oscillate laterally by any suitable means. Said bottom extends around the bottom of the cylinder as far as the part of the cylinder extends upon which the web forms. The said oscillating bottom is supported on rocking supports F, the bearings G, upon which the said supports oscillate, being preferably pointed, to obviate waste of power in friction. The bearings G′, which support the oscillating bottom E, are also preferably pointed, for the same object; but I do not limit myself to the precise construction of the supports herein shown, reserving to myself the right to use any kind of oscillating supports which I may find most advantageous in practice.

The said oscillating bottom E and the attached side pieces B′ are attached to the stationary part of the vat by a flexible, elastic, or corrugated connector, F′, which is joined watertight to both the said oscillating bottom and to the stationary part of the said vat, in such manner as to not only prevent leakage, but also to permit the free motion of the said bottom, in the manner described, without danger of tearing, cracking, or injuring the said connector. The said connector may be of rubber, rubber cloth, or any other suitable flexible material found adapted to the purpose.

H represents an adjustable regulating-plate, bent into an arc, corresponding with that part of the cylinder under which it is placed, and attached, by screws I or other suitable means, to that part of the oscillating bottom near the receiving-box J. To the upper edge of the said plate H is attached a flange, *k*, in which are formed slots *l* for the reception of the screws I, and which permit the adjustment of the said plate to and from the said cylinder; but I do not confine myself to the herein-described means for adjusting the said regulating-plate, as other means may be employed for that purpose without departing in any way from the spirit of my invention. By setting the said plate toward or removing it from the cylinder I am able to change the sectional dimensions of the channel between the said plate and the cylinder, which I find, in the manufacture of papers of different grades of thickness, a very important matter.

The receiving-box J is constructed as follows: The said box has five compartments, lettered, respectively, K K′ K″ K‴ K⁗. The compartment K is the one which receives liquid pumped back from the interior of the cylinder of the machine, such additional pulp, water, and size as is necessary for the continuous operation of the machine being subsequently added, as hereinafter described. Between the compartments K and K′ is a partition, *l′*, through the bottom of which is an opening, *m*, Fig. 5, or a passage by which the said liquid passes to the interior of the compartment K′. The compartment K′ is separated from the compartment K‴ by the side of the stationary part of the vat B and a perforated bottom, N, the space below the said perforated bottom forming another compartment, K″. Communication between the compartments K′ and K″ is established through an opening or passage, *m′*, (shown in dotted outline in Fig. 5,) and communication between the compartment K″ and the compartment K‴ is established through the perforations in the perforated floor or bottom N.

This construction and arrangement of parts permits the free passage of the liquid through the said compartments, while eliminating the

froth, which, if it passed directly to the interior of the vat, would be sure to result in the production of a spongy and inferior quality of paper. The separation of the froth is effected solely by the action of gravity, which, by the arrangement of the parts, has full opportunity to act in the separation of the lighter foam or froth from the heavier unfrothed liquid. The agitation of the water and size consequent upon the method of paper-making upon which my invention is based gives rise to the formation of considerable froth, the bad effects of which are reduced by this feature of my improvement.

The compartment K'''' has an opening, *m''*, in the bottom thereof, through which any liquid may escape which enters the said compartment. Communication between the compartment K' and the said compartment K'''' is permitted, stopped, or controlled, as circumstances may require, by a gate, O, fitted in a passage between the said compartments. The said gate, when adjusted properly, regulates the head of mixed water and size in the compartment K''', any surplus of water, which would otherwise raise the head too high, flowing off through the opening *m''*.

In the use of a pump for conveying back the overflow to the receiving-box J, which pump I prefer to be a rotary or centrifugal pump, there is of necessity much froth formed by the entrance into the said pump of air, and the thorough mixing of the said air with the glutinous water and pulp in the said pump when used in the ordinary way. To obviate this difficulty, I receive the overflow from the vat which passes out of the opening or passage E', Figs. 5 and 6, into a box, J', which box is divided into compartments R and R' by a partition, *s*.

T represents the pump, which draws its supply from the bottom of the outer compartment R'. The compartments R and R' communicate with each other through an opening or passage, P', in the bottom of the partitions *s*. This construction and arrangement excludes air from entering the pump T, and consequently prevents the formation of froth in the said pump. By these means I am able to reduce the formation of froth to a minimum, and to exclude all the froth that is formed from the compartment from which the said mixture flows to the vat.

The operation of the machine is as follows: The pulp, after screening, is fed into the compartment K''' of the receiving-box J, where it is diluted or mixed with water and size flowing up through the perforations in the bottom of the said compartment. It then passes on into the vat, flowing as nearly as possible with the same velocity as that of the rotation of the periphery of the cylinder, and therefore being at rest relatively with the said periphery, or as nearly so as it is practically possible to make it. A large portion of the pulp is drawn onto the surface of the cylinder to form the web, the fibers composing the said web being arranged indefinitely in all directions, instead of, as heretofore, lying wholly or principally in one direction.

That portion of the liquid that passes through the cylinder is pumped back to the compartment K in the receiving-box J, and that portion of the same that passes through the outlet E' is pumped back to pass again through the compartment K''' into the vat, both portions of the said liquid being used over and over again, as hereinbefore described.

I claim—

1. The combination, with the stationary part of the vat, the cylinder revolving therein, and the oscillating side pieces B', of the oscillating bottom E, attached to the said side pieces, substantially as and for the purpose described.

2. The combination, with the oscillating bottom E, the attached side pieces B', and the stationary part of a cylinder paper-making machine, of oscillating supports for the said bottom, substantially as and for the purpose specified.

3. The combination, with the oscillating bottom and attached side pieces B' and the stationary part of the vat, of the flexible connector F', substantially as and for the purpose set forth.

4. The combination of the cylinder and vat of a cylinder paper-making machine and the adjustable regulating-plate H, for adjusting the sectional dimensions of parts of the channel between the bottom of the said vat and the said cylinder, substantially as and for the purpose specified.

5. The combination, with the receiving-box for the mixed pulp, water, and size, having compartments for the separation of froth, as herein described, of a gate, O, for regulating the head of said mixture in that compartment of the said box from which the said mixture flows to the vat, substantially as and for the purpose described.

6. The combination, with the outlet of a cylinder paper-making machine and a pump for conveying the overflow of the vat back to a receiving-box, substantially as described, of a box, J', having the compartments R and R', communicating by the passage P', the said compartment R' being connected with the pump, substantially as and for the purpose described.

7. The receiving-box for maintaining a head of mixed pulp and water to cause a current through the vat, as herein described, provided with compartments K K' K'' K''', passages *m m'*, and the perforated bottom or floor N, between the compartments K'' and K''', substantially as herein described, and for the purposes specified.

JONATHAN HATCH.

Witnesses:

GEO. F. LYMAN,

EUGENE KINNE.