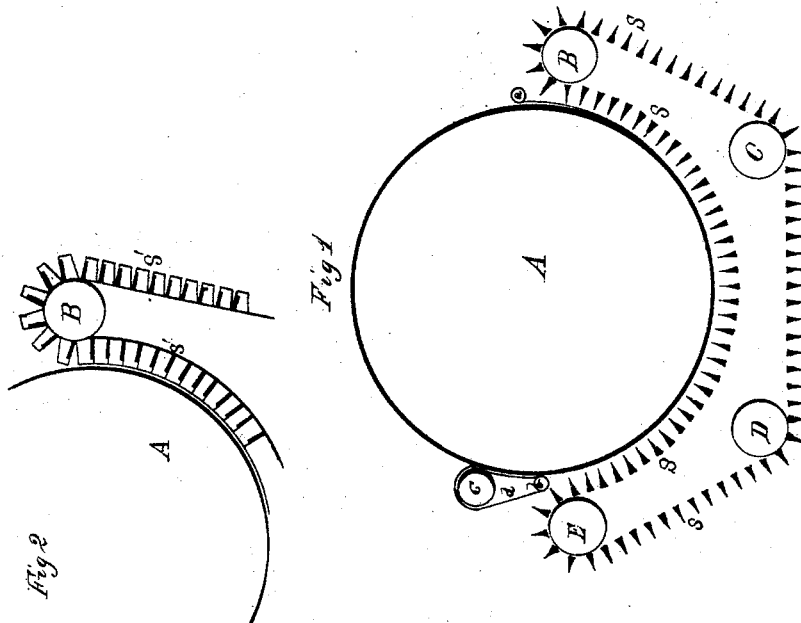
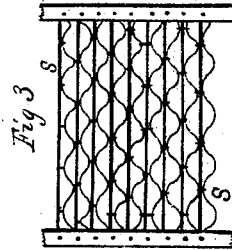
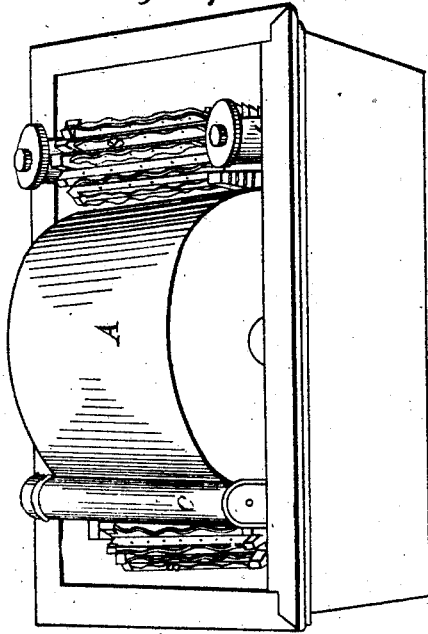


*E. N. Foote*  
*Paper Making Mach.*

*N<sup>o</sup> 45,144.*

*Patented Nov. 22, 1864.*



# UNITED STATES PATENT OFFICE.

EUNICE N. FOOTE, OF SARATOGA SPRINGS, NEW YORK.

## IMPROVEMENT IN PAPER-MAKING MACHINES.

Specification forming part of Letters Patent No. 45,149, dated November 22, 1864.

### *To all whom it may concern:*

Be it known that I, EUNICE N. FOOTE, of Saratoga Springs, in the county of Saratoga and State of New York, have invented a new and useful Improvement on Cylinder Machines for Manufacturing Paper; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a section through the cylinder and apparatus, at right angles to the shaft of the cylinder and at about its middle. Fig. 2 is part of a section, also taken at right angles to the shaft, but through one of the belts and the blocks attached to one end of the slats. Fig. 3 is a plan or view from above of a portion of the belts and slats attached, as it would appear extended horizontally between the rolls G and D. Fig. 4 is a perspective view of the apparatus in the vat that contains the paper-pulp.

In cylinder machines, as heretofore constructed, the motion of the cylinder through the liquid in which the pulp is diffused has created a wash or current along the surface of the cylinder, and the fibers of the pulp have thereby been deposited upon the face of the cylinder in directions parallel with each other and with the motion of the cylinder. The paper thus made has been deficient in strength in that direction, and, besides, the parallel fibers give a hardness and roughness to the paper that is unfavorable to type in printing. Cylinder paper has consequently been inferior to that made upon Fourdrinier machines, and the use of cylinder machines, notwithstanding their cheapness and many other advantages, has been limited to the manufacture of cheap and inferior kinds of paper.

I have remedied this defect by causing the fluid pulp when it approaches the cylinder to acquire its motion and move along with it, so that as between the two there is no movement, and the pulp is deposited upon the cylinder the same as upon the sieve in hand-made paper. Such a motion to the pulp I have best given by means of an endless band of slats. (Shown at S S S S in the drawings.) They stand off about one-half of an inch from the cylinder, encircle all that portion of it on which the pulp is being deposited, and move

along with it as if they constituted a portion of it. The pulp on its way to the cylinder enters between these slats and receives from them their motion. The wash is thus thrown outside of the slats and does no harm. The result is, I think, superior to Fourdrinier and fully equal to hand-made paper.

The slats are made about as long as the cylinder. When of wood, they are about one and one-half inches deep, one-half of an inch thick at the back, and tapering so as to present an edge toward the cylinder. The interval between them is about one inch. To each end of every slat is attached a block (as seen at S' S'' in Fig. 2) about two inches long, two inches deep, and sufficiently wide to fill the space between the slats. The sides of the blocks are beveled to correspond with the radii of the cylinder, so that when their inner edges bear against the cylinder, as shown in Fig. 2, they close the space between the slats and prevent the pulp from entering at their ends. Two rubber belts, two inches wide—one for each end of the slats—connect the whole together. One or two wood-screws passing through the belt and into the block hold it securely to its place. The blocks bear against those portions of the cylinder that are covered with cloth to limit the width of the paper, and being one-half of an inch deeper than the slats they hold them out that distance from the face of the cylinder, to allow the pulp to spread evenly over it. A portion of the belts with the slats attached is represented in Fig. 3. The slats may also be made of sheet-zinc, in which case one inch in depth and a space of five-eighths of an inch between them will be sufficient. The outer edge or that next the belt should be rolled up to three or four thicknesses to give the requisite stiffness. The motion of this band of slats moving with the cylinder from B to E, and thence returning around the rolls D and C, will be sufficiently obvious from the drawings.

In order to prevent any current endwise or between the slats, projecting plates may be attached to the sides of the slats, or a corrugated piece of sheet-zinc of the width of the slats may be attached to the sides of them, as represented in Fig. 3.

At the side of the cylinder where the paper first begins to form I suspend from the rod a, Fig. 1, a piece of leather or cloth, extending

across the whole face of the cylinder and down into the water and pulp one or two inches, so as to cover that portion of the cylinder and prevent the formation of any paper upon it until the fluid has acquired the motion of the cylinder by the action of the slats. On the opposite side, where the pulp which has been formed upon the cylinder leaves the water and ascends to the coucher, the act of separating the delicate and unpressed fibers of the pulp from the liquid creates considerable disturbance, washes the fine particles from the pulp, sometimes breaks up the pulp altogether, or leaves it in ridges or blotches upon the cylinder. In order to remedy this difficulty, I place a small roll, *b*, Fig. 1, of one inch or one and one-fourth inches in diameter below the surface of the water. Another roll, *C*, is placed a few inches above the water, and around them is a band, *d*, of rubber cloth or oil-cloth, to which the pulp will not stick. The rolls and belt extend across the face of the cylinder and bear against the cloths around the ends of it sufficiently so that they shall be carried by the cylinder and move with it. The pulp is thus held in its place while separating from the water, and compressed and carried unbroken to the coucher.

Bearings for the several rolls *B*, *C*, *D*, and *E*, that sustain the band of slats, as well as for the rolls *b* and *c*, are provided by attaching pieces of plank to the inside of the vat by screws or bolts, as shown in Fig. 4. The boxes or the journals of the roll *B* are made to slide in the piece of plank, and are held in place by screws and nuts, by turning which the tightness of the band of slats may be properly adjusted.

The journal of the roll *E* extends through the vat and receives on the end a pulley, by which a belt connected with some other part of the machinery aids in driving the band of slats and the cylinder.

Flanges upon the rolls *B* and *E* will be found useful to keep the band of slats in its place upon them, and, as one end of the cylinder is usually made a little smaller than the other, the end of the roll *B* must be correspondingly enlarged until the belt is found to run true.

Considerable variety may be given to the form of the band of slats without much affecting the result. Probably, also, a band of rubber cloth with suitable orifices in it, or even a band like a coarse-wire sieve, with proper elevations upon the sides, would partially effect the object. I do not intend to limit my claims to the particular form of band I have described, although I regard that as the best.

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. Giving to the pulp on its approach to the cylinder of a paper-machine the motion of the cylinder, by means of the band of slats described, or other equivalent means, for the uses and purposes above set forth.
2. The combination, with the cylinder, of an endless band of slats, or its equivalent, constructed and operating as and for the purpose described.
3. The use of the rolls *b* and *c* and band *d*, or their equivalents, to effect the objects specified.

EUNICE N. FOOTE.

Witnesses:

A. NEWTON,  
J. R. PECK.