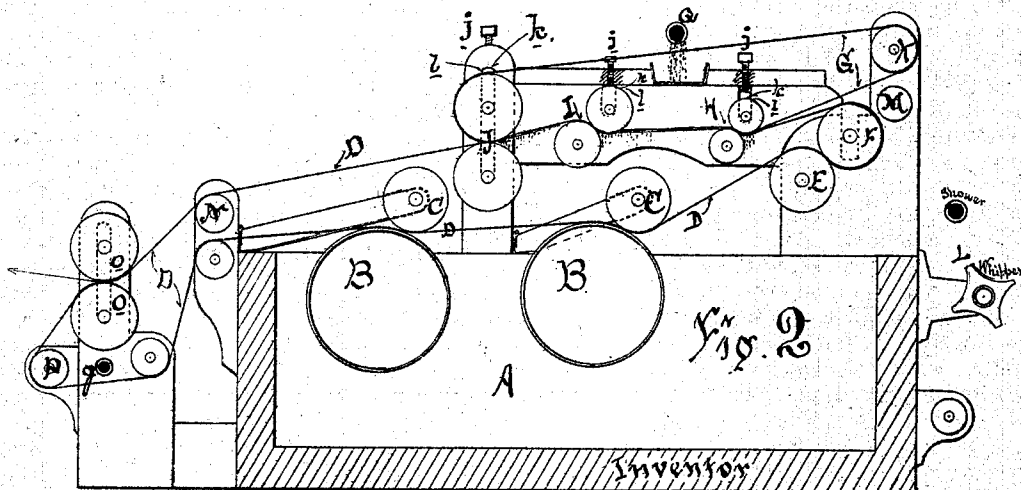
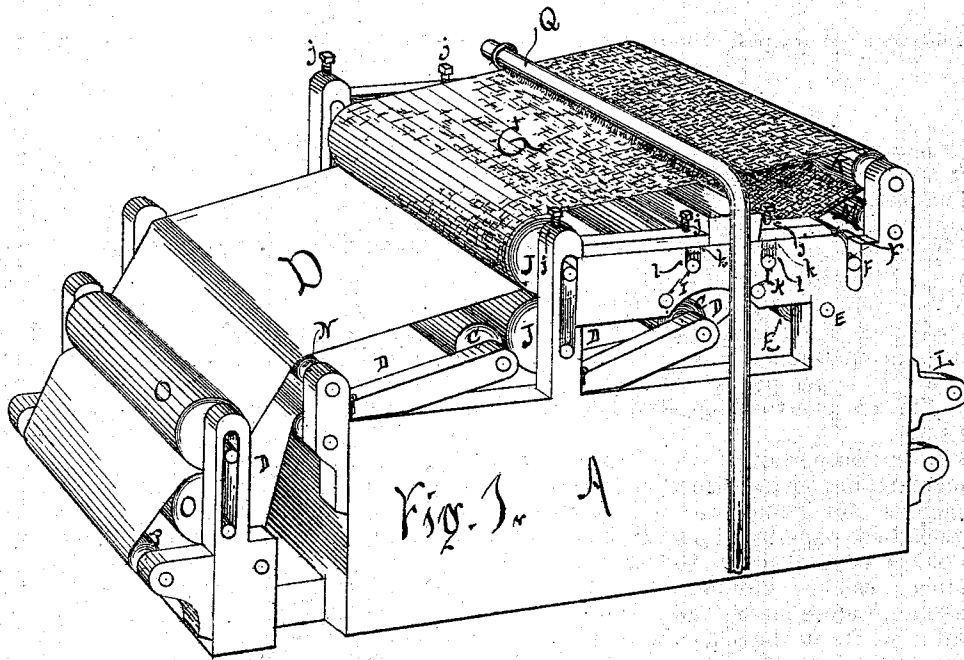


Patented Jan. 20, 1874.



Benjamin F. Fielow
By his Atty R. D. O. Smith

UNITED STATES PATENT OFFICE.

BENJAMIN F. FIELD, OF LEBANON, PENNSYLVANIA.

IMPROVEMENT IN PAPER-MACHINES.

Specification forming part of Letters Patent No. **146,520**, dated January 20, 1874; application filed April 11, 1873.

To all whom it may concern:

Be it known that I, BENJAMIN F. FIELD, of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented a new and useful Improvement in Paper-Making Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my machine. Fig. 2 is a vertical longitudinal section of the same.

This invention pertains to the class of cylinder machines, in contradistinction to Fourdrier machines, for manufacturing straw-board and other thick papers and boards, and it has for its object, first, to enable the manufacturer to produce a thicker and heavier board than has been heretofore made, and to obviate air and water marks in the same; and, secondly, to improve the means for expressing the water from the pulp-web before it reaches the upper felt, or the wire-cloth substituted by me therefor. To these ends my invention consists, in the first place, in combining, with the forming cylinder or cylinders, an endless felt, which receives the pulp from the cylinders and conveys it to the press-rolls, an endless woven-wire belt applied to the side of the pulp-web opposite to the felt, and a series of press-rolls applied to the two belts so as to press them together upon the pulp conveyed between them, and express the water through the wire-cloth; and, in the second place, in causing the pulp-web on the under side of the felt leading from the forming-cylinders to pass over and in contact with a smooth roll, and then, while still in contact with the smooth roll, to be subjected to the operation of a press-roll, which presses the felt against the smooth roll, and squeezes it partially dry before it reaches the upper felt, or the wire-cloth, when the latter is substituted for the upper felt.

In the drawings, A is the vat. B B are the forming-cylinders; C C, the couchers; D, the felt receiving the web on its under side; E, the smooth press-roll added by me, as above referred to; F, a press-roll, which may or may not form the extreme tension-roll of the felt, and the object of which is to press the felt upon the smooth roll E, so as to express a large

portion of the water from the pulp before it reaches the wire-cloth. This press-roll F is arranged so that, following the movement of the felt, the axis of the roll E comes between the cylinder and couch-roll on one side and the press-roll F on the other side, and the line of contact between the press-roll F and the felt is below the upper edge of the smooth roll in order that the water may not run back and wash off the pulp. G is the belt of wire-cloth combined by me with the felt, instead of employing simply an upper felt, as heretofore; H I J, three, more or less, sets of double press-rolls, between which pass the felt and the wire belt, with the web inclosed between them, said press-rolls being so adjusted that the pressure upon the web increases from H to J; K, the rear tension-roll of the belt G; O, the rolls for giving the final pressure to the web, and whence the web is taken off to the second press, or to the driers; g, the shower for clearing the lower felt; Q, the shower for clearing the wire-cloth belt; and k, the trough or spout into which the water falls from Q, and by which it is conducted away.

The ordinary expedients are resorted to for adjusting the tension of the felts, guiding the same in their movements, communicating power to the several parts of the machine, and adjusting and regulating the pressure of the several rolls, and need not be particularly described herein.

The operation of my improved devices is as follows: The web formed on the cylinder or cylinders B is applied to the under side of the felt, and in that position passes along over the preliminary squeezer E, by which a portion of the water is expressed. This squeezer-roll is made very smooth, and preferably of metal, so that the web will not adhere to it, and it is arranged obliquely to the left of the roll F, as shown in Fig. 2, in order that the water squeezed out between the two rolls may not run back and wash off the pulp, but may be squeezed up through the felt, and run off over the edges thereof. The web thus partially dried then passes under the wire-cloth G, when the press-rolls H I J are applied to it in order to relieve it as far as possible of its remaining moisture.

In the use of two felts heretofore in this

connection, the substance of the felts has been so impermeable by water and air that both elements were liable to be held between the felts, and, by the movements of the web in passing over the rolls, the water or the air-bubbles would be forced in one direction or another, causing defects, veins, water-marks, and air-marks in the surface of the web, which being thus permanently impressed into the structure of the web materially injured the paper or board; but, by employing the permeable wire-cloth, as described, the difficulty is entirely obviated, since both the water and the air easily escape upward, the water running off at the edges of the felt. Another great advantage of the wire-cloth is that it can be easily and perfectly cleaned by means simply of a shower, as shown at Q, the water percolating through the fine wire meshes, and passing off by the spout or trough k, thus avoiding all necessity for passing the upper belt through a wash-tub, and subjecting it to the action of brushes and squeeze-rolls in connection therewith, as heretofore practiced.

I am aware that in Fourdrinier machines, in the vibrating part upon which the pulp is first deposited, two wire-cloth belts have been employed, and also a lower horizontal belt of wire-cloth and an upper belt of felt. With such combination, however, cylinders cannot be used, and the devices as heretofore employed are impracticable except on that particular class of machines. As distinguished from all such arrangements, my machine has

the forming-cylinders and the felt for taking the pulp therefrom. I am also aware that in cylinder machines it is no new thing to employ double felts, and, as distinguished from all such machines, I employ the wire-cloth, as above described; and, finally, whether the wire-cloth be applied above or below the felt, the latter must be arranged so as to first take the pulp-web from the cylinders, then convey it to the proper place, then apply the wire-cloth on the other side of the web, and then combine the press-rolls with the two belts so as to express the water and air, and let them escape through the wire-cloth, the water running off at the edge of the felt.

Having thus described my invention, I claim—

1. The preliminary press-rolls E F, in combination with the endless felt, the wire-cloth belt, and the series of press-rolls, substantially as described.

2. The combination of the polished roll E, the felt passing from the cylinder and couch-roll over the polished roll E, as described, and the press-roll F, the polished roll E being so arranged that its axis is between the couch-roll and the press-roll F, following the course of the felt, substantially as described, for the purpose specified.

BENJAMIN F. FIELD.

Witnesses:

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