E. B. BINGHAM.

PAPER MAKING MACHINE.

No. 17,663. Patented June 30, 1857.

Fig. 1.

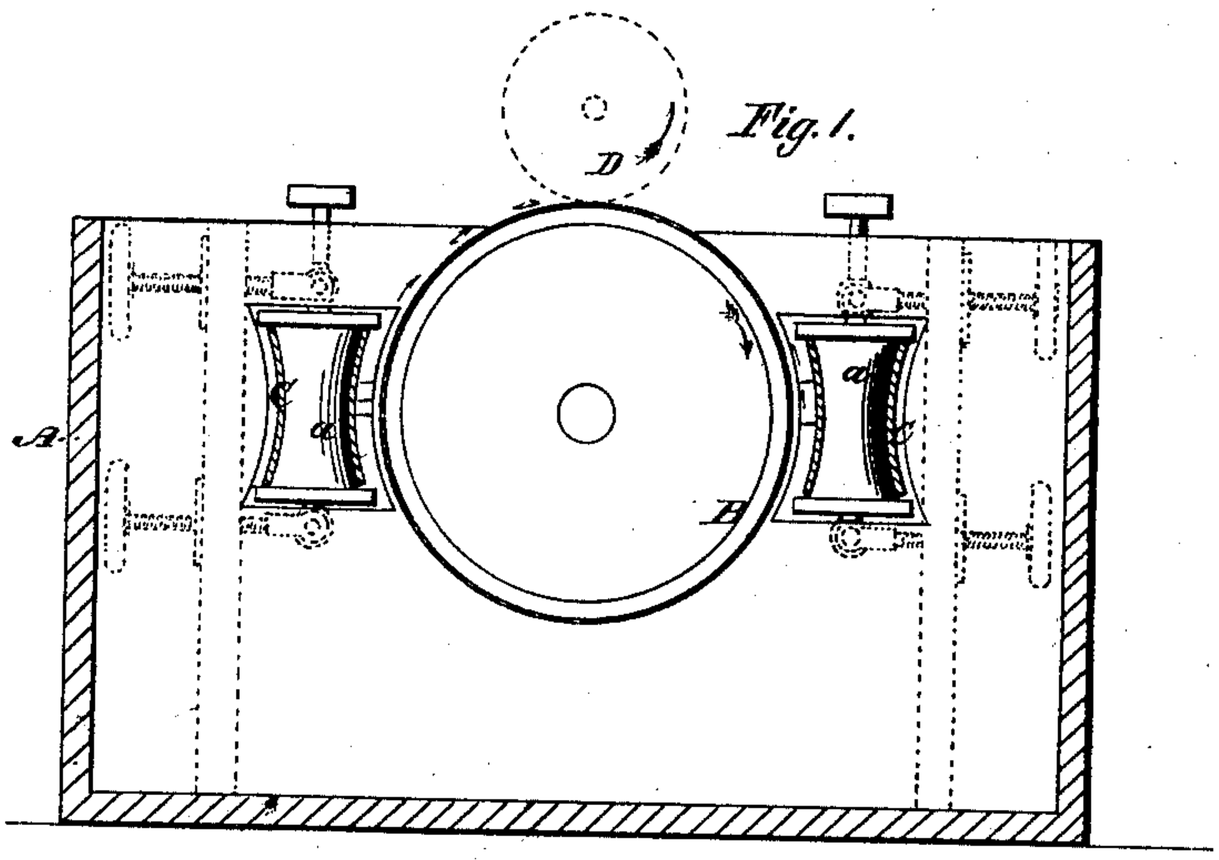
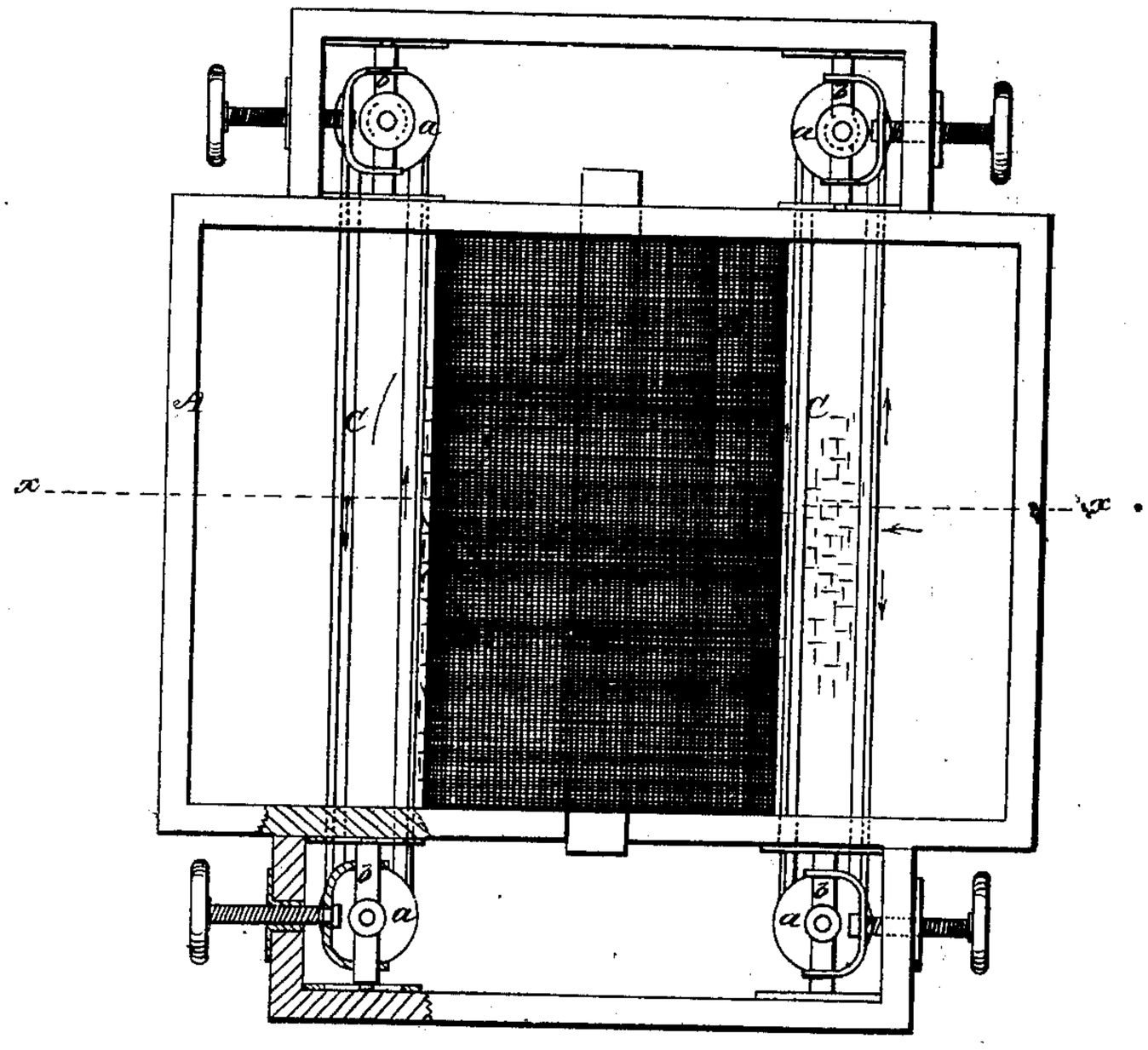


Fig. 2.



UNITED STATES PATENT OFFICE.

EDWARD B. BINGHAM, OF BROOKLYN, NEW YORK.

MACHINE FOR MAKING PAPER.

Specification of Letters Patent No. 17,663, dated June 30, 1857.

To all whom it may concern:

Be it known that I, EDWARD B. BINGHAM, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Machines for Making Paper; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section of a paper machine, with my improvement applied to it; (*x*) (*x*) in Fig. 2 indicates the plane of section. Fig. 2 is a plan or top view of the same.

Similar letters of reference indicate the same parts in both figures.

This invention relates to an improvement in what is known as the "cylinder machine" for making paper, and consists in the employment or use of one or two endless aprons placed within the pulp vat and adjoining the cylinder. Said aprons having a continuous or reciprocating motion, and by their action knitting or weaving the fibers of pulp together or through one another as they adhere to the cylinder, thereby forming very compact, firm, and tough paper, and improving its value to a very considerable degree over the kind of paper manufactured by the machine in the usual way.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents a pulp vat, of rectangular form, and having a cylinder B placed in its upper part. This cylinder is hollow, and is formed of wire cloth secured to a cylindrical frame or reel. The vat and cylinder are constructed in the usual way and therefore do not need a minute description.

Within the vat A, two endless aprons C, C, are placed. These aprons pass around rollers (*a*) placed at the sides of the vat. The aprons are placed at opposite sides of the cylinder, and the rollers (*a*) have concave peripheries, so that the aprons may be curved to correspond to the form of the cylinder. This will be understood by referring to Fig. 1. The inner sides of the aprons C are placed quite near to the periphery of the cylinder B, and they may be adjusted nearer to or farther from it, as desired, by having the axes of the rollers (*a*) fitted in sliding bearings (*b*) which may be arranged in any proper way.

The endless apron C may be constructed of india-rubber cloth or other material which will not be sensibly affected by moisture.

Directly over the cylinder B, the usual "couch roll," D, is placed, around which an apron passes. Motion is given the cylinder B by the "couch roll," and consequently they rotate in different directions, as indicated by the arrows in Fig. 1.

The pulp, properly prepared, is placed within the vat A, as shown in Fig. 1; the blue wash or tint indicating the pulp. The water will pass through the wire-cloth covering of the cylinder; the pulp, of course, being prevented from passing through, and the moisture is gradually allowed to pass out at one end of the cylinder. By this means a suction is produced within the cylinder, and as the cylinder rotates, the fiber of the pulp adheres to the wire cloth. Motion is given the aprons C, C, in any proper manner, and said aprons may have a continuous or reciprocating motion. If a continuous motion is given them, they should move in opposite directions. The aprons knit or weave the fibers of the pulp together on the cylinder so that a very compact paper is made.

The ordinary cylinder machines, which do not employ any device for knitting the fibers together, make a paper that is readily torn in one direction; for the cylinder B, as it rotates, will cause the fibers to lie upon the cylinder circumferentially in the direction of their length; the fibers not being at all knit or interwoven together. Hence the value of my improvement will at once be seen.

The pulp is taken from the cylinder B by the apron C, which passes around the "couch roll," the same as in the usual machines.

The necessity of agitating the pulp, in order to make its fibers weave together upon the cylinder, has been known for many years, and I believe was first practiced by John Dickinson, of England, 1809. In a description of his invention in Ure's *Dictionary of Arts*, published by D. Appleton & Co., New York, 1853, Vol. 2, page 340, it is stated: "When subjected merely to agitation, the water is sucked inward through the cylindric cage, leaving the textile filaments so completely interwoven as if felted among each other, that they will not separate without breaking." On page 343 of the same work a segment agitator is thus described: "In order to keep the pulp properly agitated in the

mold vat, a segment frame, having rails extended across the vat, is moved to and fro."

In the *Franklin Journal*, Vol. 4, 1827, page 309, may be found a drawing and description of Dennison and Harris' patent paper-making machine. In this machine a rotating agitator is employed near the periphery of the paper cylinder. The axis of this agitator is parallel to the axis of the cylinder. By the revolution of the agitator the fibers of the pulp are laid over and interwoven, and the pulp in the vat is also stirred. Another example of agitators thus employed is seen in O. Marland's patent, 1854. In this device the agitators consist of small spiral shafts having their axes parallel to the axis of the paper cylinder, as in Dennison and Harris' machine. By the action of these spiral agitators the pulp is stirred and currents are created in the vat, against and along the surface of the cylinders, and the fibers of pulp are thus swayed over and interwoven.

Agitators that are attached directly to shafts arranged parallel to the cylinder, whether the wings of the agitators are straight as in Dennison and Harris' machine or spiral as in Marland's, do not produce a uniform interlaying of the pulp. Each agitator produces a separate current which is of greater velocity at that point where the agitators are nearest the cylinder than elsewhere, while the pulp between two of the agitators is jumbled or foamed up. The result is that the fibers can not be evenly laid over, and the paper when finished is liable to present a "wild," cloudy or variable appearance on being held to the light.

By the use of broad belts as in my machine the sweep and current across the surface of the cylinder is rendered perfectly steady and alike at every point, and the fibers are consequently laid over and interwoven with the utmost exactitude and uniformity. Paper thus made presents a perfectly uniform appearance when held to the light, and is stronger in texture than when agitators that produce variable currents are employed.

I do not claim to be the first inventor of agitators for moving the fibers of the pulp and thus causing them to interweave.

I especially disclaim the employment of spiral agitators as in Marland's patent aforesaid.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

The employment or use of the endless aprons C, one or more, placed within the pulp vat, adjoining the cylinder B, for the purpose herein set forth.

EDWARD B. BINGHAM.

Witnesses:

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JAMES F. BUCKLEY.