

S. E. DART.
PAPER MACHINE.

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924,643.

Patented June 15, 1909.

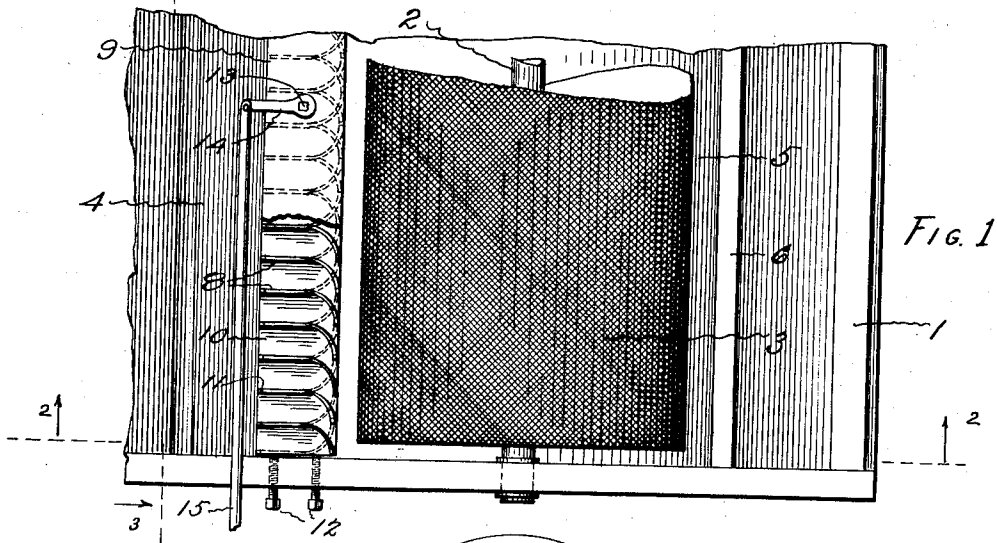


FIG. 1

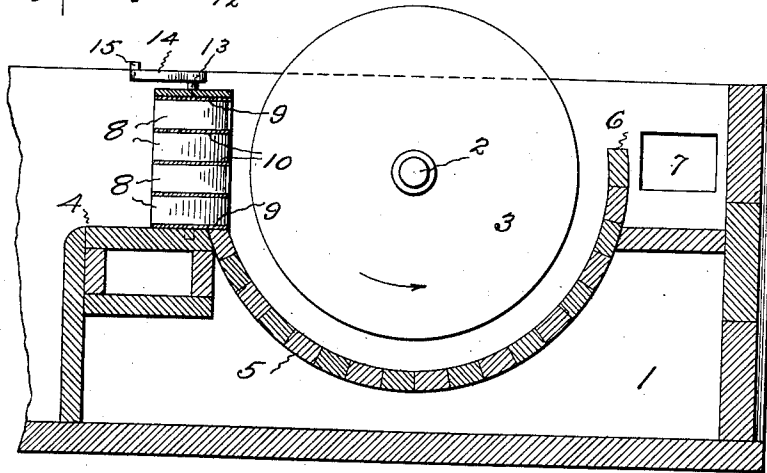


FIG. 2

FIG. 3

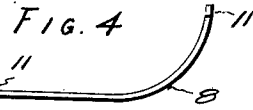
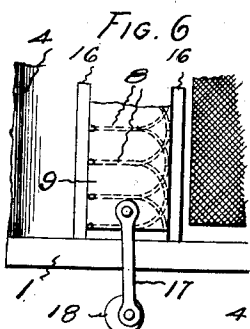
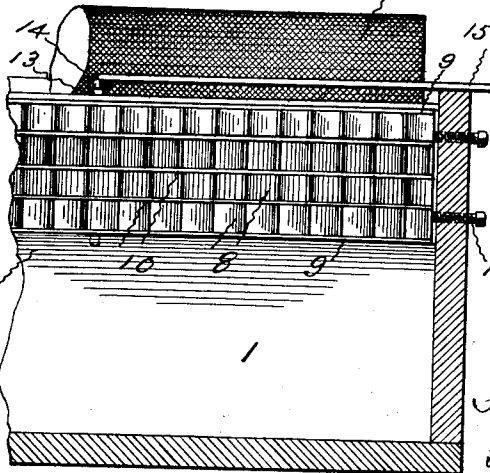


FIG. 5



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UNITED STATES PATENT OFFICE.

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PAPER-MACHINE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL E. DART, a citizen of the United States, residing at South Manchester, in the county of Hartford and State of Connecticut, have invented a new and useful Paper-Machine, of which the following is a specification.

This invention relates to the manufacture of paper of any character from stock containing more or less fibrous binder, on a single or multiple cylinder paper making machine.

Paper made on the common cylinder machine has more or less grain, that is, its fibers extend parallel in the direction of the length of the web. Such a condition renders the paper comparatively weak for, while such paper does not easily tear across the grain or fibers, it tears or splits easily in line with the length of the fibers, or with the grain. This results from the fact that the fibers, or the fibrous constituents of the binder of the pulp, travel longitudinally or lengthwise with the current, as the stuff flows in the vat, and meet the cylinder end on, and, as the cylinder revolves, are drawn parallel onto its periphery so as to lie lengthwise with respect to their movement, or transversely of the axis of the cylinder.

The object of this invention is to provide a cylinder machine with very simple, cheap and efficient means, whereby the direction of travel of the fibers of the binder in the pulp or stuff, as they flow in the vat, will be changed or deflected so the fibers will be presented sidewise to the cylinder and will be picked up thereby and laid on its surface at an angle to the line of travel, that is, parallel with or oblique to the axis of the cylinder, and thus will be interwoven to such an extent that the web formed will have no perceptible grain or easy direction of rupture. This object is attained by arranging in the vat, in front of the cylinder, deflecting plates of suitable shape, which as the stock flows past change the directions of the fibers with respect to the natural direction of their travel to and onto the cylinder, so they will be laid at angles with each other and interwoven in the web formed on the cylinder.

Figure 1 of the accompanying drawings shows a plan of a small portion of one end of

a cylinder machine, provided with means which embody this invention. Fig. 2 shows a vertical longitudinal section of the same, on the plane indicated by the dotted line 2—2 on Fig. 1. Fig. 3 shows a vertical transverse section on the plane indicated by the dotted line 3—3 on Fig. 1. Fig. 4 shows on larger scale, an edge view of one of the deflecting plates that may be used. Fig. 5 shows a side view of the same; and Fig. 6 illustrates a mechanism by which the deflecting plates may be vibrated or reciprocated transversely of the vat.

A single cylinder machine is illustrated in the drawings, although the invention is equally applicable to a multiple cylinder machine. The vat 1 of the machine shown is of ordinary size and shape and of common construction and materials. Mounted on the shaft 2, which extending transversely of the vat, is supported as usual by bearings in the side walls, and is designed to be rotated by the usual means, is the cylinder 3. This cylinder is of the customary construction and is designed to collect pulp from the vat and form it into the web which is couched in the usual way by the ordinary roll (not shown because it forms no part of the present invention) from the cylinder.

In front of the cylinder is the usual breast or dam 4, over which the pulp flows as it passes to the cylinder. Below the cylinder is the common scroll 5 with back-fall 6, over which the pulp, that is not collected upon the cylinder, flows to the outlet 7 in the side of the vat, and is pumped back in the usual way.

On the breast of the machine illustrated, and in the pass-way for the pulp or stuff, in front of the cylinder, are mounted four superposed rows or series of deflector plates 8. Each of these deflector plates is preferably curved, as shown, and all the plates in each row are arranged so as to curve in the same direction, but the plates of each alternate row are placed so as to curve in opposite directions. These deflector plates are desirably arranged in a frame 9 formed of top and bottom plates, and the plates 10 which separate the rows or series. One way of fastening the deflector plates is to provide them at both ends with lugs 11, as shown in Figs. 4

and 5, and to insert these lugs in perforations in the frame plates.

The frame carrying the deflector plates may be secured in position on the dam at any 5 desired distance from the front of the cylinder by set screws 12, which pass through the side walls of the vat into the frame. If desired, the frame carrying the deflector plates may be mounted on an arbor 13, and this 10 arbor can be provided with a rocker arm 14, that may be moved back and forth by a rod 15 actuated by any suitable means. With this construction, when the set screws are loosened, the frame and the deflector plates 15 may be given a slight oscillation or vibratory movement on the axis of the frame. The frame carrying the deflector plates could, if desired, as shown in Fig. 6, be arranged between guides 16 extending trans- 20 versely above the breast between the side walls of the vat. The frame thus mounted could be connected by a link 17 with a crank 18, or other means driven by suitable mechanism, for giving the frame a vibratory move- 25 ment, or a longitudinal reciprocation transversely of the breast and parallel with the axis of the cylinder.

The positions of the fibers, as they are deflected, with respect to the direction of their 30 flow with the stuff passing over the breast, will be determined by the direction of the curved surfaces of the ends of the plates with which they engage as they flow past the plates to the cylinder. As a result of the 35 employment of such means as are described, when the stock flows over the breast and to the cylinder, the lowest row of deflector plates will direct its course and change the position of the fibers with respect to the 40 natural direction of flow so they are inclined to meet the surface of the cylinder broad side or at an angle, and thus be drawn on parallel to or spirally with relation to the axis of the cylinder. The deflector plates immediately 45 above will cause the fibers to lie on the cylinder spirally in the opposite direction. Those next above will direct the fibers to the surface of the cylinder the same as the lowest, while the highest plate will direct the fibers 50 as do the plates next to the lowest. Any desired number of deflector plates may be used, and any number of tiers of these plates may be employed, and they may curve more or less or may even be straight, as long as they 55 are arranged to alter the natural position of the fibers with respect to the direction of their travel as the stuff flows past the plates to the cylinder.

By reason of the conditions imposed on the 60 fibers by the arrangement of deflector plates shown and described, the fibers instead of meeting the surface of the cylinder end on, and being drawn onto the cylinder parallel

and in line with the direction of travel of the surface of the cylinder, are presented side- 65 wise in different directions, to the cylinder so that some are drawn on parallel with the axis of the cylinder and at right angles to the direction of movement of the surface of the cylinder, and some are drawn on spirally in 70 one direction and some spirally in another direction, as the cylinder rotates. This causes the binding fibers to become interwoven in the web formed on the cylinder so that the paper which is produced from the 75 web that is couched from the cylinder, has no distinctive grain, it will not tear any easier one way than another, and thus is very strong. Curving the deflector plates in the manner shown, more or less restricts the space 80 through which the stock flows and this consequently increases the speed of flow of the stock just before it reaches the cylinder so that the fibers are more inclined to be laid on the cylinder in the desired manner than 85 would be the case if the speed of flow was not increased in this manner.

The invention claimed is:

1. The combination in a paper making machine, of a cylinder, and a series of curved 90 plates arranged edgewise in the pulp-way in front of the cylinder.
2. The combination in a paper making machine, of a cylinder, several series of plates superposed edgewise in the pulp-way in front 95 of the cylinder.
3. The combination in a paper making machine, of a cylinder, a series of curved plates arranged edgewise in the pulp-way in front of the cylinder, and a series of plates 100 curving in the opposite direction arranged above the first mentioned series.
4. The combination in a paper making machine, of a cylinder, several series of plates arranged edgewise one above the other in the 105 pulp-way in front of the cylinder, and plates separating the several series of plates.
5. The combination in a paper making machine, of a cylinder, a frame extending across the pulp-way in front of the cylinder, 110 plates arranged edgewise in said frame, and means for moving the frame.
6. The combination in a paper making machine, of a cylinder, a frame extending across the pulp-way in front of the cylinder, 115 plates held edgewise by the frame, and means for oscillating the frame.
7. The combination in a paper making machine, of a cylinder, a frame extending transversely of the pulp-way in front of the 120 cylinder, plates supported edgewise by the frame for directing the flow of pulp to the cylinder, and means for reciprocating and oscillating the frame bearing the plates.
8. The combination in a paper making 125 machine, of a cylinder, a frame extending

transversely of the pulp-way in front of the cylinder, plates arranged edgewise in the frame for directing the flow of pulp to the cylinder, and means for securing the frame
5 the desired distance from the cylinder.

inclined in one direction, and a superposed series of plates inclined in the opposite direction, in front of the cylinder.

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Witnesses:

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9. The combination in a paper making machine, of a cylinder, a series of plates