

(No Model.)

2 Sheets—Sheet 1.

F. W. MILLER & J. J. NEWMAN.
PAPER MAKING.

No. 340,810.

Patented Apr. 27, 1886.

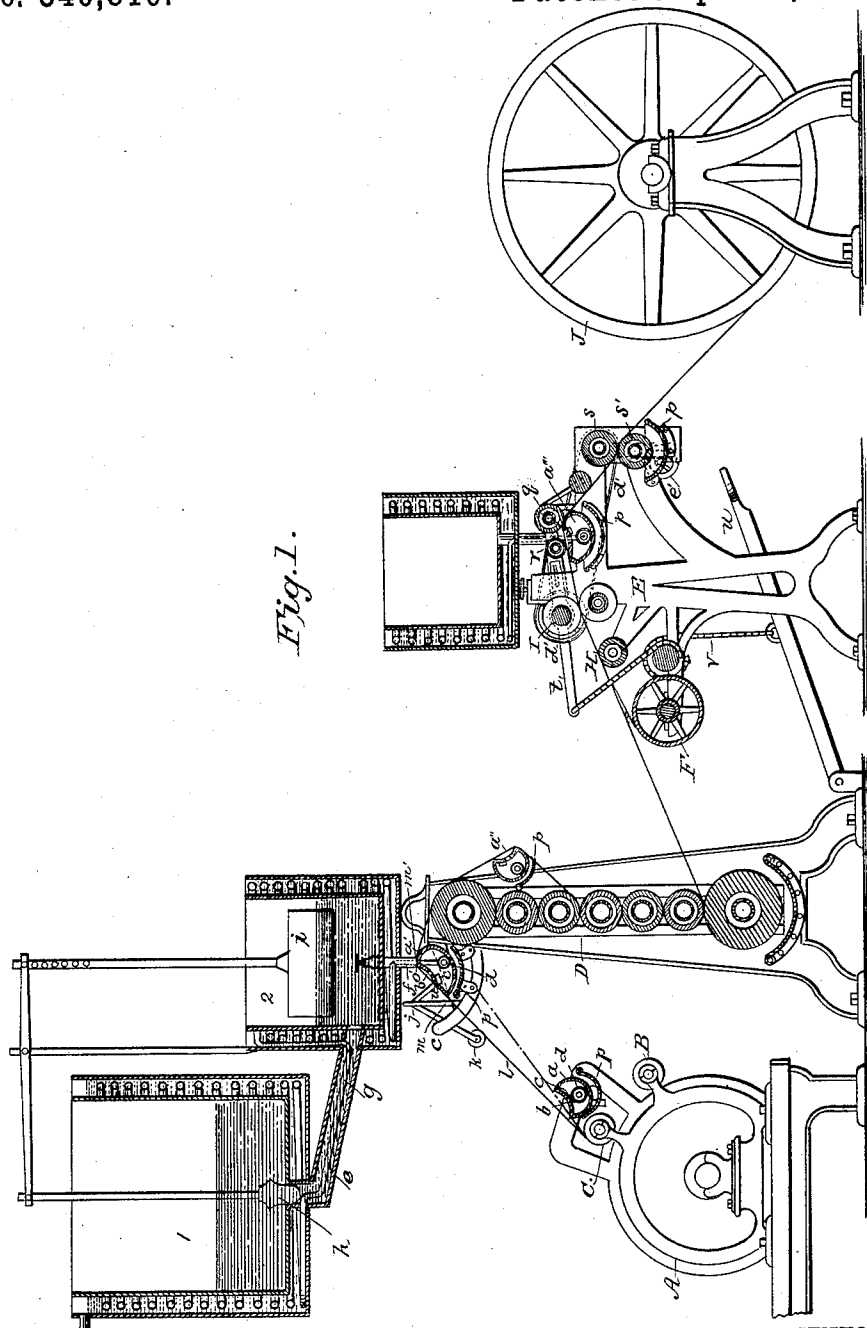


Fig. 1.

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ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

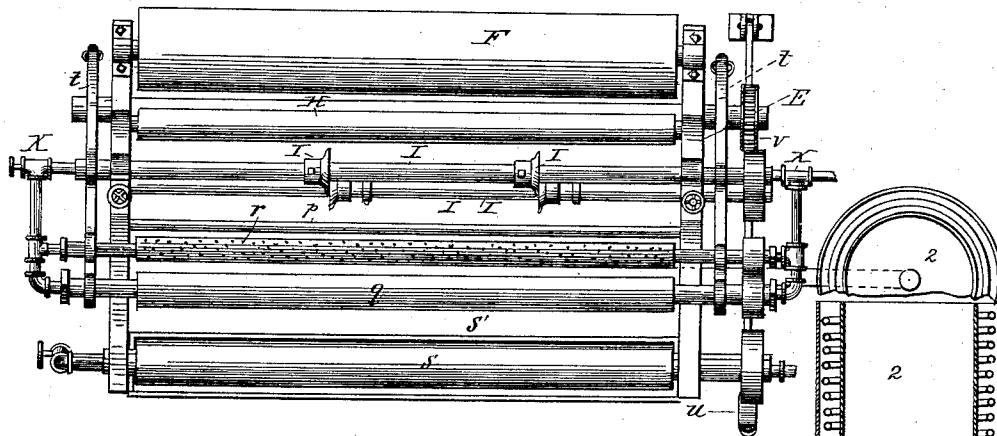


Fig. 3.

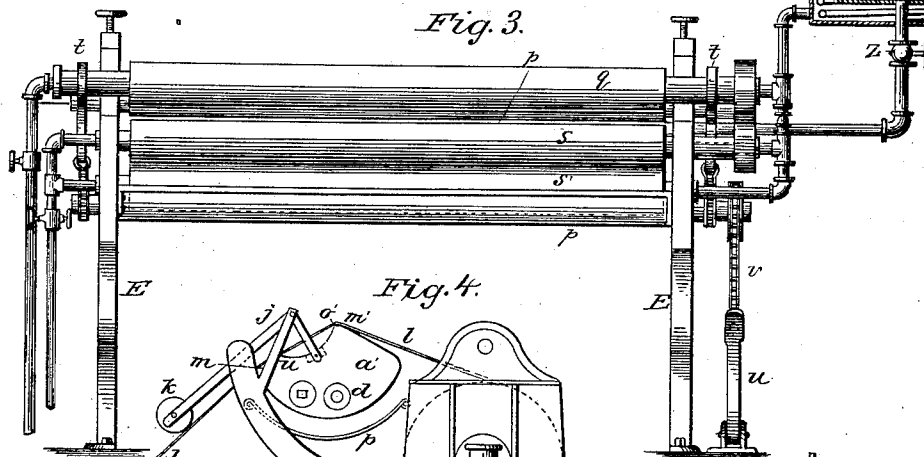


Fig. 4.

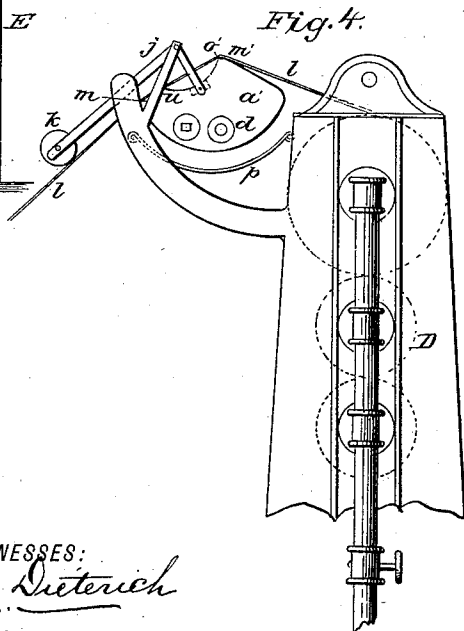
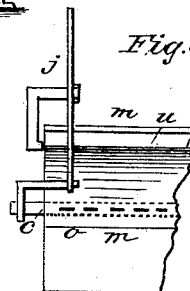


Fig. 5



WITNESSES:

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UNITED STATES PATENT OFFICE.

FREDERICK W. MILLER AND JOHN J. NEWMAN, OF ELKHART, INDIANA.

PAPER-MAKING.

SPECIFICATION forming part of Letters Patent No. 340,810, dated April 27, 1886.

Application filed January 25, 1886. Serial No. 189,736. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK W. MILLER and JOHN J. NEWMAN, of Elkhart, in the county of Elkhart and State of Indiana, have invented certain Improvements in Paper-Making, of which the following is a description.

Our invention consists in the novel construction, arrangement, and combination of certain mechanical devices to be attached to as an improvement on and made a part of a paper-machine, for the purpose of and in the method of applying paraffine, wax, or other substances to and incorporating the same into and through a web of paper during the process of making and finishing, rendering it water-proof, &c.

Our improvement relates to a means for heating the wax or other material employed, applying and incorporating it into and polishing the surface prior to winding the paper upon a reel.

In the drawings, Figure 1 is a longitudinal vertical section of the rear part of a paper-machine with our improvement attached in different positions. Fig. 2 is a top or plan view of the splitter-stand E. Fig. 3 is a rear vertical view of the splitter-stand E. Fig. 4 is a front vertical view of calender-rolls D, with size-box and steam attachments. Fig. 5 is a detail view of size-box *a'*, slide-valve *e*, and compound lever *j*.

Similar letters refer to similar parts throughout the several views.

In Fig. 1, A represents the rear drier with roll B, which carries the drier-felt, and C a yielding guide-roll, over which the web of paper is carried after leaving the drier; D, a stack of calender-rolls; E, a stand bearing a small reel, F, guide-roll H, and splitter-knives I; and J, a large reel upon which the web of paper is wound when finished, all being parts of a paper-machine.

Our improvement consists in a hollow cylindrical automatic distributor or size-box, *a*, with a small section of the surface *b* depressed and usually made concave, with orifices at regular intervals in the lower center of the concave surface, through which melted wax or other substances when supplied will readily flow to the outer surface, said flow being regulated by the slide-valve *e*, together

with the appliances for heating the wax or compound used and conveying it to the interior of the distributor size-box, which is also heated by means of a steam-pipe, *d*, as shown, and in the use of calender-rolls supplied with steam-pipes passing through their centers for heating them sufficiently to hold the wax or other compound applied in a liquid or semi-liquid state until it is thoroughly incorporated into the web of paper, and made smooth and well finished with calendered surfaces. This latter may be readily accomplished by so regulating the supply of steam to the calenders as to carry a higher temperature in the upper than the lower rolls.

The size-box may be made of iron or other metal, cylindrical or irregular in form, to conform to the position which it is to occupy when attached to a machine. *a a' a'' a'''* represent different positions where this size-box may be attached by means of suitable arms or bearings to the frame-work of a machine. If attached to the stand E, additional devices are necessary to complete the work of incorporating the wax or other substances used into the web and finishing the surface of the paper, as hereinafter described. Should this device be placed in front of the first or upper calender-roll, we have the size-box *a'*, the tanks 1 and 2, with steam and supply pipe connections. Tanks 1 and 2 are made double, between the walls of which is placed a coil of steam-pipe sufficient to raise temperature to fuse the wax. The space between the walls being also filled and supplied with water, tank 1 is set with one-half ($\frac{1}{2}$) its height or more above 2, and connected therewith by the pipe *e*. Tank 2 is connected with size-box *a* by pipe *f*. The steam-coils lying between the walls of tanks 1 and 2 are connected by the pipe *g* inside of the pipe *e*, serving to preserve the temperature of the wax while passing from tank 1 to tank 2. Tank 2 and size-box *a'* are connected by steam-pipe inclosed in supply-pipe in same manner.

The wax or other substance used is placed in tank 1, and when sufficiently heated flows into tank 2 through pipe *e*. The uniform quantity desired in tank 2 is regulated by means of the valve *h* and float *i* with their connections, as shown. The flow of wax or substance used out of the size-box *a'* onto its

concave surface *b*, is regulated by the elevation in tank 2 and the slide-valve *c* while the machine is in operation.

The compound lever *j* has one end attached to the slide-valve *c*, and has at its other end a bearer or dance-roll, *k*, which is carried on the web of paper *l* as it runs over the machine. The moment the web breaks or loses its tension between the drier and calender, the dance-roll *k*, by its own weight, drops to bearings on the frame and instantly closes the slide-valve *c*.

In operation the size-box *a'*, being adjustable on its bearings, is set at such angle with the calenders that the web of paper *l*, as it passes from the drier A over the guide-roll C to the calenders D, will adhere closely to the size-box as it slides over its surface at the points of contact *m* and *m'*. The heated wax or other substance used, flowing through the slide-valve *c* by the pressure from its elevation in tank 2, comes in contact with and is spread onto the web of paper *l* as it leaves the surface of contact with the size-box at the lower angle of its concave surface at *u*. The paper next comes in contact with and by its tension adheres closely to the convex surface of the size-box at the upper angle of its concave surface at *o*. The drawing of the web *l* over the convex surface *m'* tends to spread the wax evenly over its surface, removing such surplus as may be carried to this point, throwing it down the concave surface to the point of supply. The web next passing over and between the heated calender-rolls, the wax or substance used is thoroughly incorporated into and through the paper, which is also calendered to a highly-polished surface on both sides and made water-proof. Leaving the heated calenders, the paper is carried over the slitter-stand and onto the reel, as represented. *p p p* are ordinary drip-pans to receive any waste from either size-box or calenders.

If above automatic size-box be attached to a machine, as at *a* or *a''*, the same heating apparatus and connections would be used as above described and set forth.

If placed upon the slitter-stand E as *a'''* in addition to the heating apparatus above described and indicated, we have the revolving heated roll *q*, the hollow perforated automatic size-roll *r* and the heated calender-rolls *s* and *s'*. The heated roll *q* and the automatic size-roll *r* are made adjustable horizontally and vertically by having their bearings on the extension-arm *t*, which has its bearings on the slitter-shaft I. Pressure by the foot upon the lever *u* communicated to the arm *t* by means of the ratchet-wheel, shaft, and chain *v*, raises the roll *q* and size roll *r* to any elevation desired.

The heated calender-rolls *s* and *s'*, the heated roll *q*, and the perforated automatic size-roll *r* are given motion direct or reverse by means of a belt, *d'*, over pulley on slitter-shaft I, as indicated.

The size-roll *r* is a hollow cylinder with supply and steam pipe, and fittings for bear-

ings, and flexible bearings *x*, as shown in Fig. 2. This roll is perforated with small holes, through which the wax or other material used is forced to the outer surface by pressure from tank 2, regulated by valve *z*, as shown. This roll may be made to revolve at a greater or less speed than the moving web of paper, and with direct or contrary movement, as desired. The surface of the roll in contact with the paper spreads the material supplied evenly over its surface, and in quantity as regulated by the operator by means of the globe-valve *z*, Fig. 2. The calender-roll *s'* and drip-pan *p* are adjustable, and may be lowered and raised by means of the hand-wheel *e'* and gearing at will.

In operation the paper passes the slitter-knives I directly to and between the automatic size-box *a'''*, and the perforated size-roll *r*, where the wax is spread upon both upper and under surfaces, and is diffused throughout the sheet as it slides over the surface *m'* under slight pressure by the heated roll *q*, and is calendered to a smooth surface by the heated rolls *s* and *s'* before being wound upon the reel J.

It will be understood that the several distributors or size-boxes *a* *a'* *a''* *a'''* might be used in conjunction, or any one might be used separately, as before described.

Our improved method is especially designed for the waterproofing of tissue-paper while running in an unfinished state over a tissue-paper machine.

In defining the invention attention may be called to the fact that the paraffine or other material is applied to the paper while the latter is in such an unfinished spongy condition as will cause it at once upon the application to absorb all of such material that the web will carry, the finishing and polishing being subsequently done by the calendering-rolls. Now, it will be seen that by making the application of the waterproofing material prior to the finishing of the thin paper the material is thoroughly incorporated with the body of the paper instead of being simply spread on the surface of the paper. It will also be noticed that by so applying the waterproofing prior to the finishing of the paper the same devices serve to finish the paper and press the waterproofing paraffine.

We claim as our invention—

1. The method of waterproofing paper consisting in applying the material to the paper while the latter is in an unfinished condition, and subsequently finishing the paper, substantially as set forth.

2. In combination with a machine for making paper, a distributor adapted to apply waterproofing material and arranged in advance of the finishing devices, whereby the material will be applied to the paper while the latter is in an unfinished condition, substantially as set forth.

3. In a paper-machine, a distributor, substantially as described, having a portion of

its surface depressed, whereby a delivery or spreading edge and a reducing-edge are provided, substantially as set forth.

4. In a paper-machine, a distributor having
5 a portion of its surface depressed, forming delivery and spreading edges, and adjustably supported, whereby the web of paper may be caused to move in close contact with such edges, substantially as set forth.

10 5. In a paper-machine, the combination, with a distributor having a discharge and a valve controlling the same, of a pivoted lever connected with the valve and having a bearer adapted to rest upon and be supported by the
15 web of paper, whereby normally the valve will be open, and in case of breakage of the web or slacking thereof the valve will be closed, substantially as set forth.

6. The combination, in a paper-machine, with
20 a distributor and a tank, of a pipe connecting such parts, and a steam-pipe disposed in said connecting-pipe, substantially as set forth.

7. In a paper-machine, and as a means for
25 spreading paraffine and the like on the upper surface of a web, a foraminous size-roll, *r*, sub-

stantially as described, and for the purposes specified.

8. The cylindrical automatic size-box with its steam-pipe *d*, supply-tanks 1 and 2, with steam-coils and connecting-pipe *g*, inclosed in supply-pipe *e*, automatic valve *h*, slide-valve *c*, combination-lever *j*, connecting slide-valve *c*, and dance-roll *k*, substantially as set forth. 30

9. In combination with a distributor and devices by which to guide the paper in contact therewith, a supply-tank connected with said distributor and comprising inner and outer casings and heating-pipes interposed between said casings, substantially as set forth. 35

10. The combination of the framing or support having guides for the paper being treated, the lever *t*, pivoted to said support, the foraminous size-roll, and the roll *g*, supported in said lever, substantially as set forth. 40

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Witnesses:

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