J. N. PADDACK.

MECHANISM FOR GRADUALLY DIMINISHING THE PRESSURE UPON PAPER BOARD ON THE CYLINDER.

No. 182,285. Patented Sept. 19, 1876.

Fig: 1.

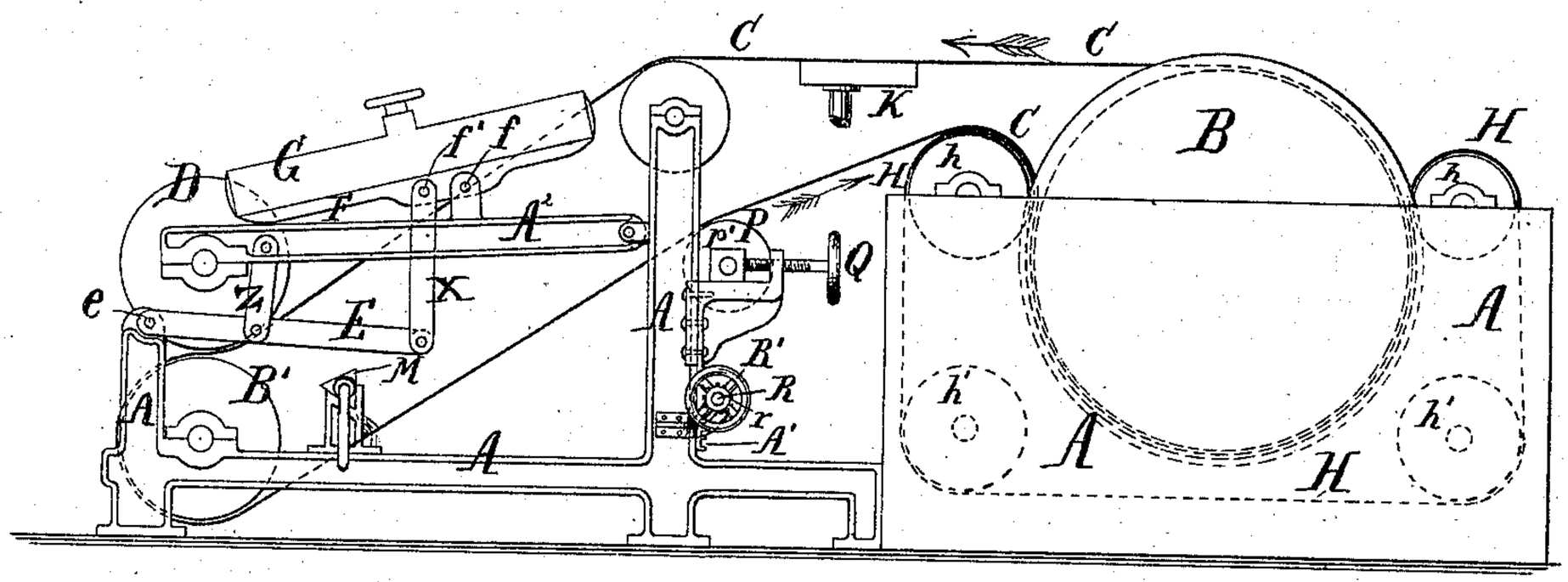


Fig: 2.

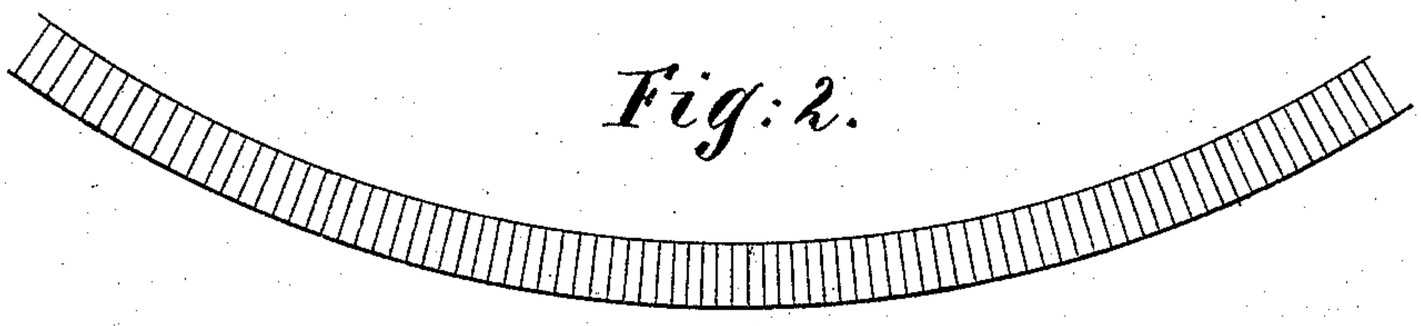
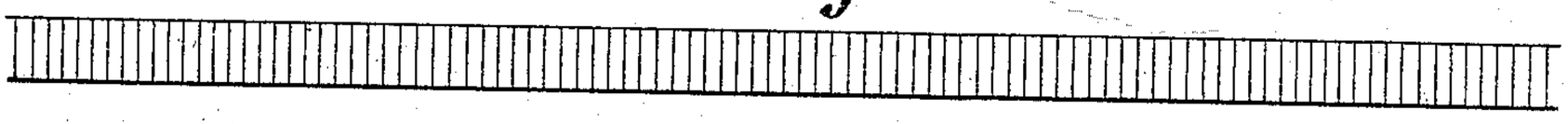


Fig: 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

J. NELSON PADDACK, OF SYRACUSE, ASSIGNOR TO HIMSELF AND HOWARD LOCKWOOD, OF NEW YORK, N. Y.

IMPROVEMENT IN MECHANISMS FOR GRADUALLY DIMINISHING THE PRESSURE UPON PAPER-BOARD ON THE CYLINDER.

Specification forming part of Letters Patent No. **182,285**, dated September 19, 1876; application filed April 3, 1876.

To all whom it may concern:

Be it known that I, J. N. PADDACK, of Syracuse, in the State of New York, have invented certain Improvements Relating to Pasteboard-Machines, of which the following is a specification:

I designate as paper-board all the varieties of paper and analogous products which are made of considerable thickness by accumulating a succession of layers of thin paper-stock one upon the other, causing them to adhere together.

My invention applies to that class of paper-board machines in which the pulp is wound in continuous layers upon a roller, and on which the aggregate sheet is afterward cut, and the bent mass removed and straightened. The great convenience of this mode of manufacturing has induced its extensive adoption, although there is an obvious inequality in the structure on the two sides, in consequence of the condensing of the original outer side in the act of straightening or flattening.

I find that the material can be made more nearly homogeneous and uniform by varying the pressure under which the several thicknesses are produced or applied together on the roller. I gradually diminish the pressure from the commencement to the close of the operation of winding a sheet.

I take up the successive layers from a vat by means of an endless web, analogous to that in the Fourdrinier machine, but shorter. I establish the limits of the breadth by deckels, which run with the web around a large roller immersed in the vat. My deckels traverse around in their relations, as shown, to the endless wire-belt, while it is immersed in the vat, and also perform their return motion within the vat.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawings form a part of this specification.

Figure 1 is a side view of the entire machine. Fig. 2 is a cross-section through the paper-board as produced on the roller, shown on a large scale. The divergence of the lines extending radially across from the concave to the convex side shows the difference in the density on the two sides in this condition, the inner and concave side being most compressed, and, consequently, most dense. Fig. 3 represents the same after it has been flattened. The lines now show it of about equal density.

Similar letters of reference indicate like parts in the figures.

A is the fixed frame-work, a prominent portion of which is a capacious vat, adapted to hold a supply of paper-pulp. B is a slowly-revolving roller or cylinder turning thereon. C is an endless belt of brass wire, analogous to that used in the ordinary machine known as the Fourdrinier. B′ is a roller mounted in fixed bearings, around which the web C passes at the end of the machine farthest from the vat. K is a suction-box, or a series of suction-boxes, adapted to perform the ordinary function of that feature of paper-manufacturing mechanism.

A thin layer of pulp gathered from the vat on the outer surface of the belt C, after being partially dried and hardened on the latter, is wound off upon the roller D. The other cylinders may be mounted in fixed bearings, which are adjustable by hand, but the axis of the roller D is allowed to rise automatically as the paper material is wound on. The bearings are guided by yielding arms A^2, fixed at the other end, but capable of rising and sinking within considerable limits, to allow for the change in elevation of the roll D, required by the accumulation of the pasteboard between it and the roll B′.

The roll D is journaled in the yielding ends of the arms A^2, and these arms are more or less supported on levers E, which turn on pivots *e*, and are connected at their other ends by rods X, leading, as shown, to the pins *f′*, fixed in the side of a tilting bar or lever, F, which is mounted on a pivot, *f*. A rod, Z, connects the lever E to the arm A^2, and rod X connects the lever E to the bar F, as shown. This bar F carries a parallel tube, G, of sufficient diameter, closed at both ends, and provided with any suitable means for receiving and discharging water at will. When in use, this tube G should be about half filled. This

water is distributed uniformly throughout the tube when the tube is horizontal, but is free to flow toward either end as the tube is inclined.

At the commencement of an operation, when the roller D is bare, its axis descends a little, which induces a low position of the pins f', and consequently such an inclination of the tube G as causes the weight of the water in the tube G to act with great force through the connections, to depress the roller D. Thus conditioned, a strong pressure is produced on each layer of the paper-stock as they are successively wound upon the roll. But when, by the gradual accumulations of the paper material on the roller D, and consequently by the lifting of the latter as it rests upon the roller D′ below it, the pins f' are gradually raised, each addition of a thousandth of an inch more or less of thickness causes an elevation of the corresponding end of the tube G to a tenfold or hundredfold greater extent, and consequently changes the inclination of the tube G, causing it, if continued long enough, to become at first level and ultimately inclined in an opposite direction. This change, as it gradually progresses, induces a corresponding or still greater change in the pressure upon the paper material accumulated on the roller. When the proper thickness is attained, the paste-board, straw-board, or whatever may be the name of the paper material produced, is removed and flattened in the ordinary manner and with the ordinary effect, except that inasmuch as the outer layers have been formed under less pressure than usual, and are, therefore, less dense on being taken from the cylinder, the subsequent contraction and condensation which the outer portion receive in the act of flattening will render the whole nearly or absolutely uniform in density when completed. M (see Fig. 1) is a washer, allowing water to flow in sufficient quantities upon the belt at each revolution to wash off any adhering material and leave the belt clean for its succeeding immersion. P is a tightening-roller, which is delicately adjustable in height to adjust the tension of the web C. The bearing block or supports p' which support the axis of this roller are adjustable by screws Q turned by hand from time to time, to adjust the belt. The roll is raised and lowered at will by means of a shaft, R, operated by a hand-wheel, R′, and engaging, by small pinions r, in racks A′ on the framing A. H are deckels, which perform their ordinary functions of determining the edges of the thin sheet of material which is taken up from the vat A by the motion of the web C. They are stretched over rollers, the lowermost of which, h' h', are within the vat A near the bottom. The deckels therefore traverse constantly immersed in the vat, except the small portion, which is, for the time being, on the upper rollers h h. The length of the connections between the levers E and the pins f', as also the positions of the latter and of various other parts, may be made adjustable within wide limits, and the proportions may be varied, so as to make the difference in the compression of the two surfaces greater or less at will. I can thus make the ultimate destiny of the exterior surface of the web greater or less than that of the inner surface of the same instead of exactly uniform, if desired.

My machine allows the compression of the different surfaces with varying degrees of force for other purposes than that here designated, if desired.

Some of the details of my machine may be varied within wide limits. Thus, instead of a tube, G, a corresponding function may be performed by an open trough of sufficient length and depth; and the end—the gradual diminution of pressure on the paste-board or analogous material being formed—may be attained with some perfection by other means than by the transfer of water or other fluid, as herein shown. But I prefer this as the most simple and efficient.

I claim as my improvement in the manufacture of paste-board, straw-board, and other material—

1. In paper manufacture the within-described process consisting in gradually diminishing the pressure upon the concentric layers of pulp from the interior to the exterior, as it accumulates, to give an equal density throughout when the material is divided and flattened out, substantially as specified.

2. The combination of the rollers D B′ and belt C with the connections E X Z, the arm A^2, and the graduating device G, as and for the purposes specified.

In testimony whereof I have hereunto set my hand this 27th day of March, 1876, in the presence of two subscribing witnesses.

J. NELSON PADDACK.

Witnesses:

FREDERIC A. LYMAN,

W. E. LANSING.