J. LEWTHWAITE.

FOURDRINIER TYPE OF PAPER MAKING MACHINE.

APPLICATION FILED JAN. 2, 1912.

1,050,367.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

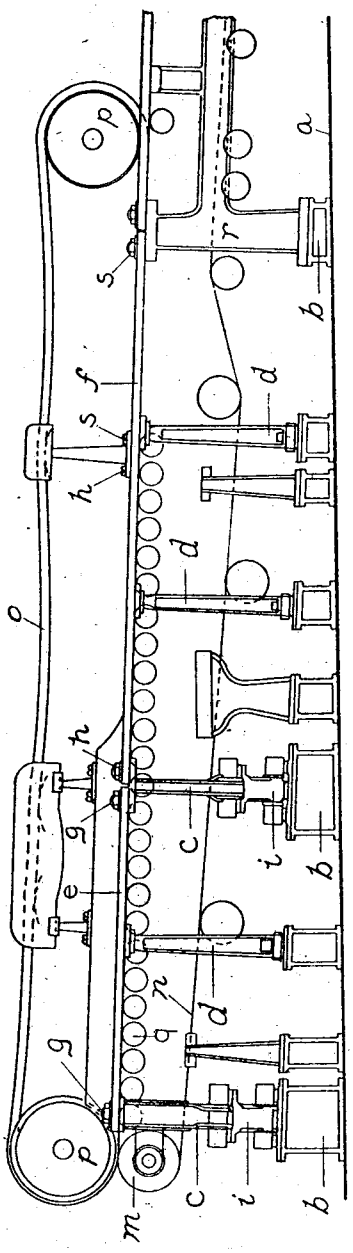

Fig. 1.

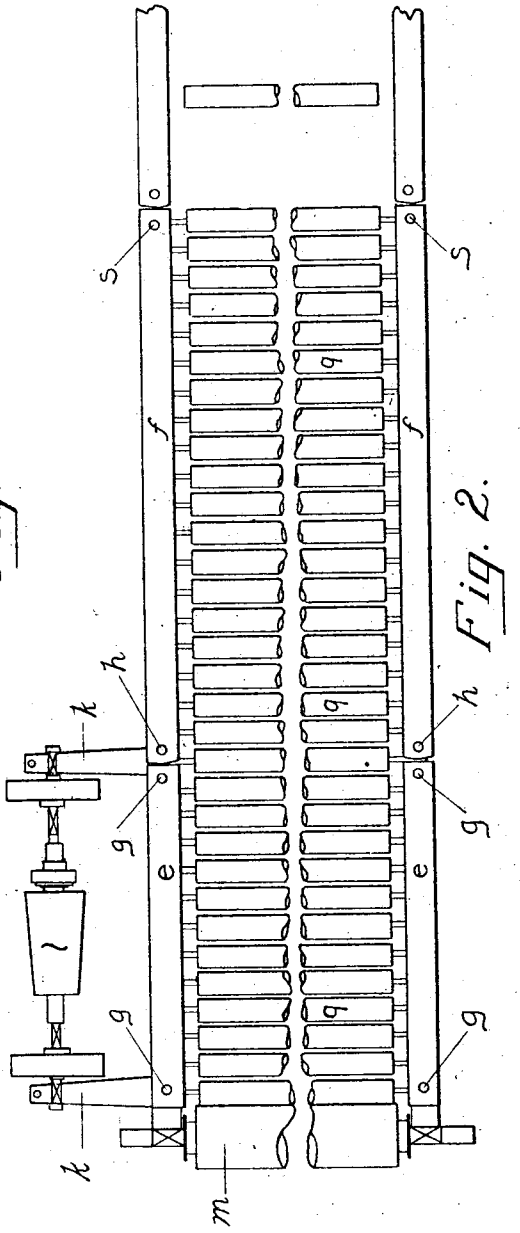

Fig. 2.

WITNESSES:

Wm. C. Schmitt

Cecil Long

INVENTOR

John Lewthwaite

BY T. J. Heisler

ATTORNEY

J. LEWTHWAITE.

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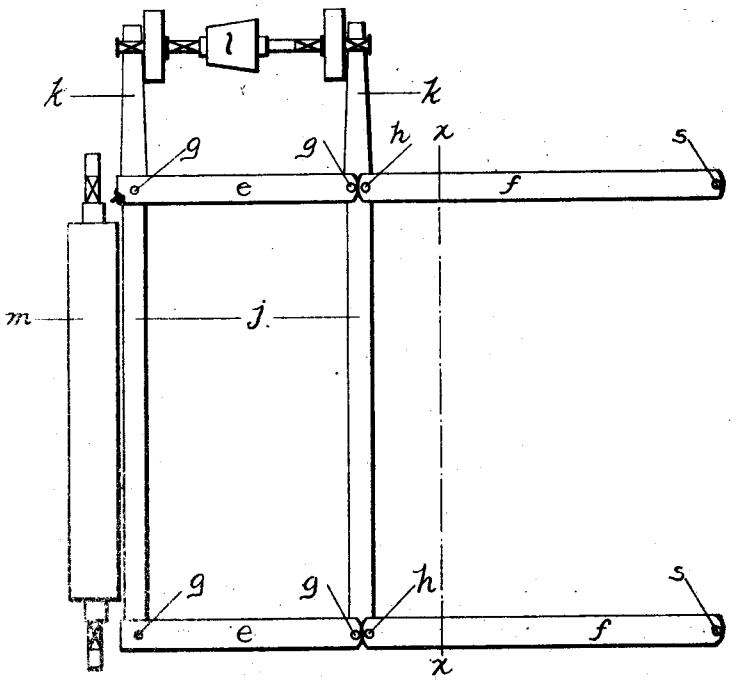

Fig. 3.

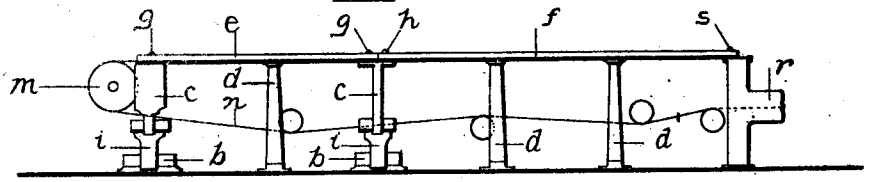

Fig. 4.

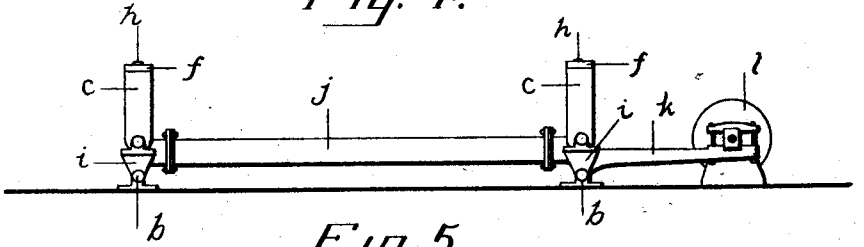

Fig. 5.

WITNESSES:

Wm. C. Schmitt

Cecil Long

INVENTOR

John Lewthwaite

BY F. H. Geisler

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN LEWTHWAITE, OF WEST OREGON CITY, OREGON.

FOURDRINIER TYPE OF PAPER-MAKING MACHINE.

1,050,367. Specification of Letters Patent. Patented Jan. 14, 1913.

Application filed January 2, 1912. Serial No. 669,133.

To all whom it may concern:

Be it known that I, JOHN LEWTHWAITE, a citizen of the United States, and a resident of West Oregon City, Clackamas county, State of Oregon, have invented a new and useful Improvement in Fourdrinier Type of Paper-Making Machines, of which the following is a specification.

My invention relates both to the method and mechanical means embodied in the paper machines of the "Harper" or "Fourdrinier" type. Reviewing briefly the present state of the art in this respect, in order to more readily understand the purpose of my improvement: Under the Fourdrinier type of machine, as known, is understood a device embodying means for imparting a lateral vibration to the "wire cloth" carrying the pulp, in order to assist and promote the "felting" process by overcoming the tendency of the fibers to be affected by the forward motion of the wire and, in consequence, assuming a position parallel to each other, pointing in the direction of travel, instead of interwinding and "felting." The side motion obtained in the Fourdrinier type of machine causes a portion of the fibers to assume a position more or less at right angles to the direction of travel, and in so doing promotes the felting process. However, it is known that the Fourdrinier type of machine heretofore did not fully accomplish the end desired, for it is still easy to tell by the tearing of the sheet of paper so produced which way it was made in the machine. In other words, the felting process was not perfectly accomplished. I have discovered that the reason for such defective felting, notwithstanding said lateral shake, resides in the difficulty of properly adjusting the lateral vibration so as to fully accomplish its purpose. The lateral shakes should be so regulated that as much water as possible will have escaped through the wire cloth before the paper reaches the "suction boxes" of the machine. But as the fibers will only "felt" so long as they are suspended in the water, the latter must, on the other hand, be prevented from draining off too soon. By too rapid a lateral shake of the wire cloth the pulp is moved sidewise so violently that the tendency of the water to fall through the meshes of the wire cloth is checked, and, furthermore, the sheet is thinned at its edges by the stuff being violently thrown against the deckle straps.

In the hand-made process of paper making, the fibers are intertwined or felted when the agitation is at its maximum while the water is drawn off rapidly: and the nearer we can simulate this hand-process in the machine the more uniform and stronger will be the paper produced.

James H. Annandale, in his patent dated October 30, 1911, Number 660,808, on paper making, informs us "that the production of close textures in paper is dependent upon the removal of the water simultaneously with the fullest operation of the shake," and "that the shake only felts the paper when the quantity of water is so reduced that the individual fibers drop against and jostle one another."

In the Fourdrinier paper machine, as heretofore constructed, the pulp does not settle down immediately after it leaves the "slices," for the stuff is then still in a very turbulent condition, and the pulp is not in the best condition for felting until the speed of the stream of pulp and the wire cloth carrying it are about the same, which occurs some distance beyond, that is, in advance of the breast roll. Such point may be theoretically located about half way between the breast roll and the first suction box, and at such point the shake should be as great as at the breast roll, for it will be then more effective in causing the interlining and intertwining of the fibers as required by the felting process. In the former Fourdrinier machine the maximum lateral shake subsided too abruptly to accomplish its purpose. Taking advantage of this discovery, I have so improved the shaking mechanism and the frame supporting the breast roll and the wire cloth as to cause such wire cloth to receive a uniform lateral vibration throughout its length for some distance beyond the point at which the conditions are at their best for the proper felting process.

Incidentally my improvement carries with it two further advantages: First, since in the type of machine referred to, the wire cloth, in passing around the breast roll, is held by the latter against lateral movement adjacent the breast roll, and since the lateral motion is greatest at the breast roll and diminishes from that point, there is a tendency for the wire cloth to work in the mesh

at the breast roll, and the resulting attrition has been found to shorten its life perceptibly. In my improvement, however, since a section of the wire beyond the breast roll has imparted to it uniformly the same degree of lateral vibration, and since there is no rigid restraint of the wire cloth at the forward end of its said uniformly vibrated section, the working of the wire cloth in the mesh is reduced to a minimum and its life is, in consequence, greatly prolonged. Since the wire cloth is an important item of expense the benefit is obvious. Secondly, my improvement introduces an additional bearing for the frame supporting the vibrated wire cloth, which is of great benefit, for since the wire cloth is necessarily made of considerable length, this necessitates long bars at the sides in which the "table rolls" are journaled, and if the bearings of such side bars are far apart the weight imposed upon them has a tendency to cause a torsional strain on the side bars of the frame, throwing the table rolls out of alinement, wrinkling the wire cloth and producing bad results. Furthermore my improvement permits greater speed, since the maximum shake is applied to the sheet of pulp at the very point where it is most effective, and hence the pulp does not have to remain on the wire cloth so long, but may be moved at greater speed.

In the accompanying drawings constituting a part of this specification I have illustrated diagrammatically the improvement introduced by me in said type of paper making machine, and by which improvements I attain the end described.

In said drawings: Figure 1 shows a side elevation of that portion of a paper machine of the Fourdrinier type, in which my invention is embodied; Fig. 2 shows a plan of the same portion of the machine; Fig. 3 is a diagrammatic plan view representing the skeleton of the frame or table by which the table rolls are supported, and on which the breast roll is also mounted; Fig. 4 is a diagrammatic side elevation of the parts of the machine shown in the preceding view; and Fig. 5 is a diagrammatic transverse section taken on the line *x*—*x* of Fig. 3.

On the base, *a*, shown in Fig. 1, are mounted a series of blocks, *b*, *b*, graduated in height and on the latter are mounted standards *c*, *c*, and *d*, *d*, adapted to be laterally vibrated. The standards, *c*, *c*, are mounted on pivoted supports *i*, *i*, the inside pair of which are made with integral arms, *k*, *k*, which are connected with a cone drive in any convenient manner, the cone drive including an eccentric element and permitting the adjustment of the belt, as usual, so as to be able to adjust the intensity of the shake to suit the different grades of pulp stock operated upon.

The devices shown but not described are understood to be of the common construction and in fact the machine diagrammatically represented shows a well known type of machine modified and improved in its construction, as specifically stated by me, but otherwise operated in the usual manner.

The pivoting strands are connected by connections, *j*, *j*, as usual. The upper ends of the standards, *c*, *c*, are pivoted to the extremities of the bars, *e*, *e*, the pivots therefor being represented by *g*, *g*. In the side bars, *e*, *e*, are journaled the table rolls *q*. On the right-hand pair of standards, *c*, *c*, as shown in Fig. 1, are also mounted the rear ends of the side bars *f*, *f*, the forward ends being pivoted to the rigid uprights *r*. The pivots of the bars, *f*, *f*, are represented by *h* and *s*.

m is the breast roll and over the latter and the series of table rolls *q* runs the endless wire cloth *n*.

o represents the deckle straps supported by deckle pulleys *p*, *p*.

A portion of the series of table rolls is journaled in the side bars, *f*, *f*, as shown in Fig. 2. By means of the cone pulley drive and its connections, that section of the wire cloth supported by the table rolls journaled in the side bars, *e*, *e*, receives a uniform lateral shake throughout its length, while that portion of the wire cloth in advance of the section referred to, thus in advance of the pivotal point *h*, receives a gradually diminishing lateral vibration which is *nil* at the pivotal point *s*. There is consequently a maximum lateral shake of the wire cloth from the breast roll *m* to the pivotal point, *h*, *h*, and since the section of wire cloth in advance of the breast roll vibrates with the latter at uniform speed all the working of the wire cloth in its meshes, and resultant attrition, is reduced to a minimum.

In one of the machines built by me for the purpose of testing and demonstrating the efficiency of my invention, the pivotal point, *g*, *g*, farthest in advance, thus at the right of the breast roll, as shown in the drawings, will locate at a point distant about seven feet from the breast roll. At this point, as mentioned, the speed of the flowing pulp, and the travel of the wire cloth are the same, all turbulence has subsided, the greater portion of the water has already been drained off, and all conditions are at the best for inducing the process of felting of the fibers. As mentioned above, the length of the section of wire cloth receiving a uniform lateral shake should be so determined as to bring its forward end, that is, the end farthest beyond and in advance of the breast roll, at a point where the speed of the flowing pulp and the travel of the wire are the same, and where the turbulence,

occasioned by the rush of the stuff beneath the slices, has subsided and a considerable percentage of the water has already drained through the wire cloth. On two machines built by me for testing and demonstrating the efficiency of my improvement, said point was located approximately seven feet in advance of the breast roll, and at such point the wire cloth was given the same degree of lateral shake as directly in front of the breast roll; it was also operated by the same drive. Consequently the same degree of lateral shake was uniformly imparted to said section of the wire cloth, which section had an area of about 85 sq. ft. The side motion so imparted was, as usual, about one-fourth of an inch throw.

I claim:

1. In the mechanical process of paper making the method which consists in imparting to the sheet of pulp a longitudinal motion and simultaneously imparting to the initial section of such sheet a uniform maximum lateral vibration throughout its length.

2. In the mechanical process of paper making the method which consists in imparting to the sheet of pulp a longitudinal motion and simultaneously imparting a maximum lateral vibration to such sheet at its initial point and at a point located in advance of the latter.

3. In a paper making machine of the type referred to, the combination with the endless apron and means for longitudinally moving the same, of means for simultaneously imparting to the initial section of said apron a uniform maximum lateral vibration throughout its length.

4. In a paper making machine of the type referred to, the combination with the endless apron and means for longitudinally moving the same, of means for simultaneously imparting a maximum lateral vibration to said apron at its initial point and a point located in advance of the latter.

5. In a paper making machine of the type referred to, comprising an endless traveling apron, means adapted to impart to the initial section of said apron in advance of the breast roll of said machine a uniform lateral vibration throughout its length, and diminishing said vibration beyond such initial section.

6. In a paper making machine of the type referred to, comprising an endless traveling apron, the combination of articulated supporting means for the breast roll and the traveling apron and vibratory means adapted for imparting a uniform lateral shake to said supporting means at the breast roll and at a point in advance of the breast roll, and diminishing said vibration beyond said point.

7. In a paper making machine of the type referred to, comprising an endless traveling apron, the combination with the supporting means of the breast roll and the traveling apron, of means for imparting lateral vibration, and said vibrating means being connected with said supporting means at the breast roll and also a point in advance of the latter.

8. In a paper making machine of the type referred to, comprising an endless traveling apron, the combination with the supporting means of the breast roll and the traveling apron, of means for imparting lateral vibration, of a primary bearing for said supporting means and a supplementary bearing therefor located in advance of the breast roll, and said supporting means being adapted to be vibrated between said bearings, both of said bearings being connected to said means imparting lateral vibration.

9. In a paper making machine of the type referred to, comprising an endless traveling apron, the combination with the supporting means of the breast roll and the traveling apron, of means for mparting lateral vibration, of a primary bearing for said supporting means and a supplementary bearing therefor located in advance of the breast roll, and said supporting means being jointed to render them vibratable between said bearings, both of said bearings being connected to said means imparting lateral vibration.

10. In a paper making machine of the type referred to, comprising an endless traveling apron, the combination of primary and secondary bearings laterally rockable, a frame formed in two sections the first section of said frame being supported at its ends on said primary and said secondary bearings, and one end of the second section of said frame being supported on the secondary bearings and its opposite end being pivoted on fixed bearings; said frame supporting the breast roll and the table rolls for the endless apron of the machine; and means for vibrating the primary and secondary rockable bearings simultaneously.

JOHN LEWTHWAITE.

Witnesses:
JAS. H. CARY,
CECIL LONG.