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W. FIBEL.

FOURDRINIER MACHINE.

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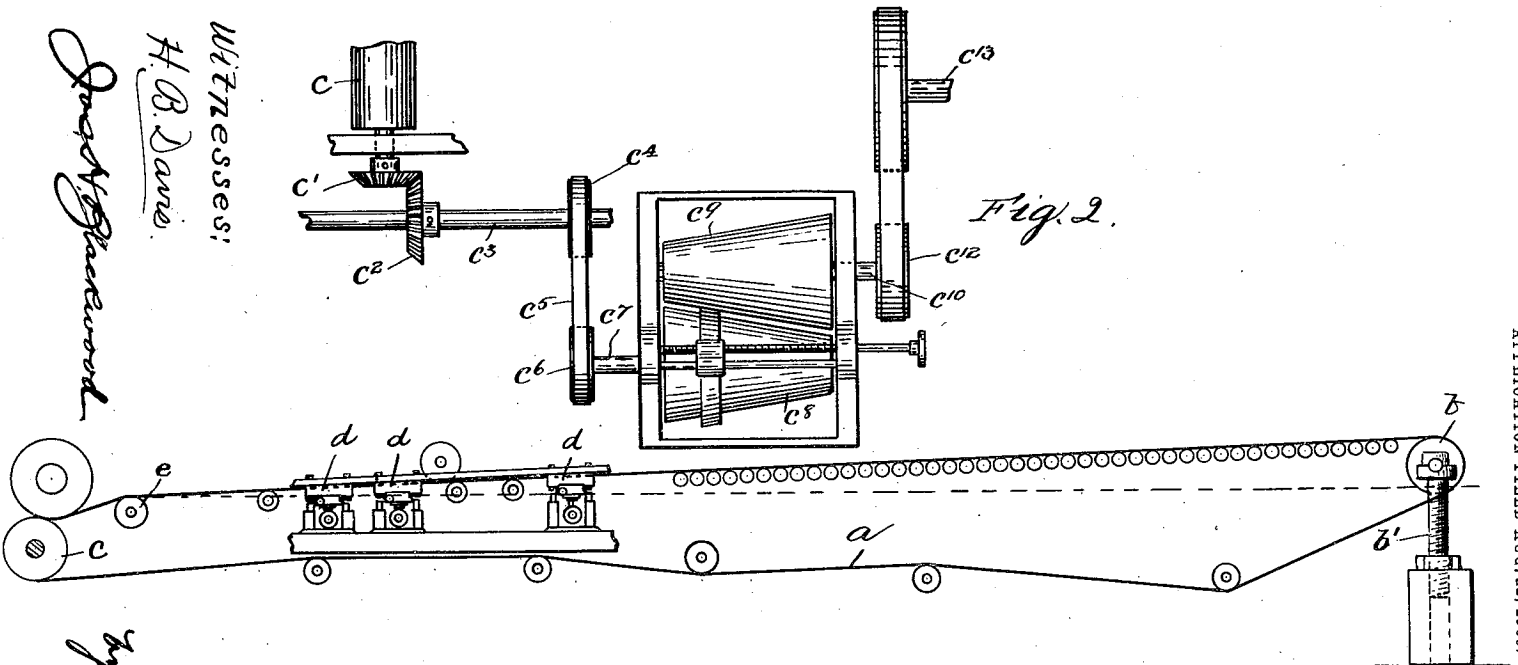


Fig. 2.

Fig. 1.

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UNITED STATES PATENT OFFICE.

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FOURDRINIER MACHINE.

No. 845,224.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM EIBEL, of Rhineland, county of Oneida, State of Wisconsin, have invented an Improvement in Fourdrinier Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to Fourdrinier machines, and has for its object to construct and arrange the machine whereby it may be run at a very much higher speed than heretofore and produce a more uniform sheet of paper which is strong, even, and well formed.

My invention is embodied, essentially, in the first part or element of the machine having the Fourdrinier wire or paper-making wire, and consists in causing the stock to travel by gravity in the direction of movement of the making-wire and approximately as fast as the making-wire moves, thereby resulting in a "gravity-feed" for the machine. The stock may be and preferably is caused to travel more rapidly than the normal or usual speed of the making-wire for a certain grade of stock, and means are provided for increasing the speed of the machine so as to cause the making-wire to move at a higher rate of speed than usual, being substantially equal to the speed of the rapidly-moving stock. To accomplish this result in a simple manner, the breast-roll end of the paper-making wire is maintained at a substantial elevation above the level, thereby providing a continuous downwardly-moving paper-making wire, and the declination thus given to the wire is such that the stock is caused to travel by gravity in the direction of the movement of the wire and substantially as fast as the wire moves. The declination of the paper-making wire may be adjustable or the speed of the wire may be variable, or both the declination and speed of the wire may be adjustable, in order that the velocity produced by gravity in the stock on the declining wire will approximately equal the speed of the wire. By this arrangement the speed of the machine may be increased to such an extent as to bring the speed of the making-wire up to the maximum velocity of

the rapidly-moving stock and a strong, even, and well-formed sheet produced which is more uniform than usual.

Figure 1 shows in side elevation a sufficient portion of a Fourdrinier machine to illustrate my invention. Fig. 2 is a plan view of a detail of the machine, showing the means for adjusting the speed of the making-wire.

a represents the usual Fourdrinier wire or paper-making wire; *b*, the breast-roll; *c*, the lower couch-roll; *d*, the suction-boxes, and *e* the wire-guide roll.

The lower couch-roll serves as the driving-roll for the making-wire, and, as herein shown, it has secured to it a bevel-pinion *c'*, which is engaged by a bevel-gear *c''*, secured to a shaft *c'''*, bearing a belt-pulley *c''''*, over which a belt *c'''''* passes, which passes over a belt-pulley *c''''''*, secured to a shaft *c'''''''*, bearing a cone-pulley *c''''''''*, which is engaged by a cone-pulley *c'''''''''*, secured to a shaft *c''''''''''*, bearing a belt-pulley *c'''''''''''*, which is connected by a belt with the driving-shaft *c''''''''''''*. The means herein shown for driving the making-wire provide for adjusting its speed; but in lieu thereof any other suitable means may be employed.

The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide for running with different grades of stock—as, for instance, with quick stock and slow stock; but so far as I am aware the making-wire has always had to perform the work of drawing along the stock, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast-roll end of the wire, which gradually diminished until an equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibers lay down uniformly and produce a well-formed sheet of paper. The machine has been run necessarily at a slow rate of speed to give ample time for the water to escape and for the fibers to lay down so as to make a uniform sheet, and in case the time was insufficient the

breast-roll end of the wire has been lowered still farther until the desired result was accomplished. In accordance with my invention I operate entirely above the level to
5 cause the stock to travel by gravity at a velocity approximately equal to the speed of the making-wire, which I believe to be a new principle of operation.

The breast-roll end of the making-wire *a* is
10 maintained at a substantial elevation above the level, so that the wire declines. The declination of the wire is sufficient to enable the stock by gravity to move at a rapid rate of speed, which speed is substantially equal
15 to the speed of the making-wire, so that the waves or ripples are eliminated. The making-wire may decline continuously from end to end or from the breast-roll to the guide-roll or from the breast-roll to the suction-
20 boxes; but in practice I prefer to decline the making-wire from the breast-roll to the guide-roll, and in such event the frame which supports the suction-boxes will be adjusted to correspond to the declination of the making-
25 wire to thereby support the suction-boxes at different elevations corresponding to the declination of the wire.

The elevation above the level at which the breast-roll end of the making-wire is main-
30 tained will vary according to the grade of stock; but in any event it will be substantial, so as to cause the stock to move rapidly by gravity.

For the purpose of adjusting the breast-roll
35 end of the making-wire the bearings of the breast-roll may be adjusted by means of a screw *b'*, or any other suitable means may be employed for this purpose.

For the purpose of increasing the speed of
40 the machine to the maximum I maintain the breast-roll end of the making-wire at a high elevation above the level, so that the stock travels by gravity much faster than the making-wire ordinarily runs for a certain grade of
45 stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the making-wire up to the speed of the rapidly-moving stock, and as a result the capacity of the machine is largely in-
50 creased.

I find in practice that by providing a gravity-feed operating substantially as herein described the stock runs smoothly and evenly without waving or rippling, and the fibers
55 are thereby permitted to settle with great uniformity as regards their distribution over the wire, so that the paper in addition to being well formed is very uniform. Furthermore, as the stock is moving with the paper-making wire instead of being moved by the
60 wire, or essentially by the wire, the formation of the paper will begin at the start and will continue to the end of the travel of the stock with the wire. Furthermore, by mak-

ing the sheet of paper uniform over all less
65 sulfite or strengthening material is required. Furthermore, as the stock carries less water when arriving at the suction-boxes the amount of suction ordinarily required may be
70 reduced, thereby reducing the friction due to the making-wire passing over the suction-boxes, and hence increasing the life of the wire.

Having thus described my invention, what I claim as new, and desire to secure by Let-
75 ters Patent, is—

1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a substantial elevation above the level, whereby the stock is caused to
80 travel by gravity, rapidly, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire, substantially as described.

2. A Fourdrinier machine having the
85 breast-roll end of the paper-making wire maintained at a high elevation, whereby the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock, and having means for
90 increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly-moving stock, substantially as described.

3. A Fourdrinier machine having the
95 paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the
100 direction of movement of the wire and at a speed approximately equal to the speed of the wire, substantially as described.

4. In a Fourdrinier machine, a continuously-downward-moving paper-making wire,
105 and means for adjusting the speed of the wire so that the wire will move at a speed approximately equal to the velocity of the stock produced by gravity, substantially as described.
110

5. In a Fourdrinier machine, a continuously-downward-moving, adjustably-declined paper-making wire, the declination and speed of the wire being adjustable, so
115 that the velocity produced by gravity in the stock on the declining wire is approximately equal to the speed of the wire, substantially as described.

6. In a Fourdrinier machine, a paper-making wire moving continuously downward
120 from the breast-roll to the guide-roll, whereby the stock is caused to travel by gravity in the direction of movement of the wire, and means for adjusting the speed of the wire so that the velocity produced in the stock by
125 gravity on the declining wire is approximately equal to the speed of the wire, substantially as described.

7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction-boxes supported at a corresponding declination, substantially as described.

8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction-boxes arranged at different elevations, substantially as described.

9. In a Fourdrinier machine, a paper-making wire having its breast-roll end maintained at a substantial elevation above the level whereby the stock is caused to travel by gravity in the direction of movement of the wire, means for adjusting the breast-roll end of said wire to different elevations above the level, and means for adjusting the speed of the wire to approximately equal the velocity of the stock produced by gravity, substantially as described.

10. In a Fourdrinier machine, a paper-making wire declining from the breast-roll to the guide-roll whereby the stock is caused to travel by gravity in the direction of movement of the wire, means for adjusting the breast-roll end of said wire to different elevations above the level, and means for adjusting the speed of the wire to approximately equal the velocity of the stock produced by gravity, substantially as described.

duced by gravity, substantially as described.

11. In a Fourdrinier machine, a paper-making wire having its breast-roll end maintained at a substantial elevation above the level whereby the stock is caused to travel by gravity in the direction of movement of the wire, and means for adjusting the breast-roll end of said wire to different elevations above the level whereby the velocity of the stock produced by gravity approximately equals the speed of the wire, substantially as described.

12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the velocity of the wire in the same direction, that waves and ripples on the stock are substantially avoided and the fibers deposited with substantial uniformity on the wire, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM EIBEL.

Witnesses:

B. J. NOYES,
CYNTHIA DOYLE.