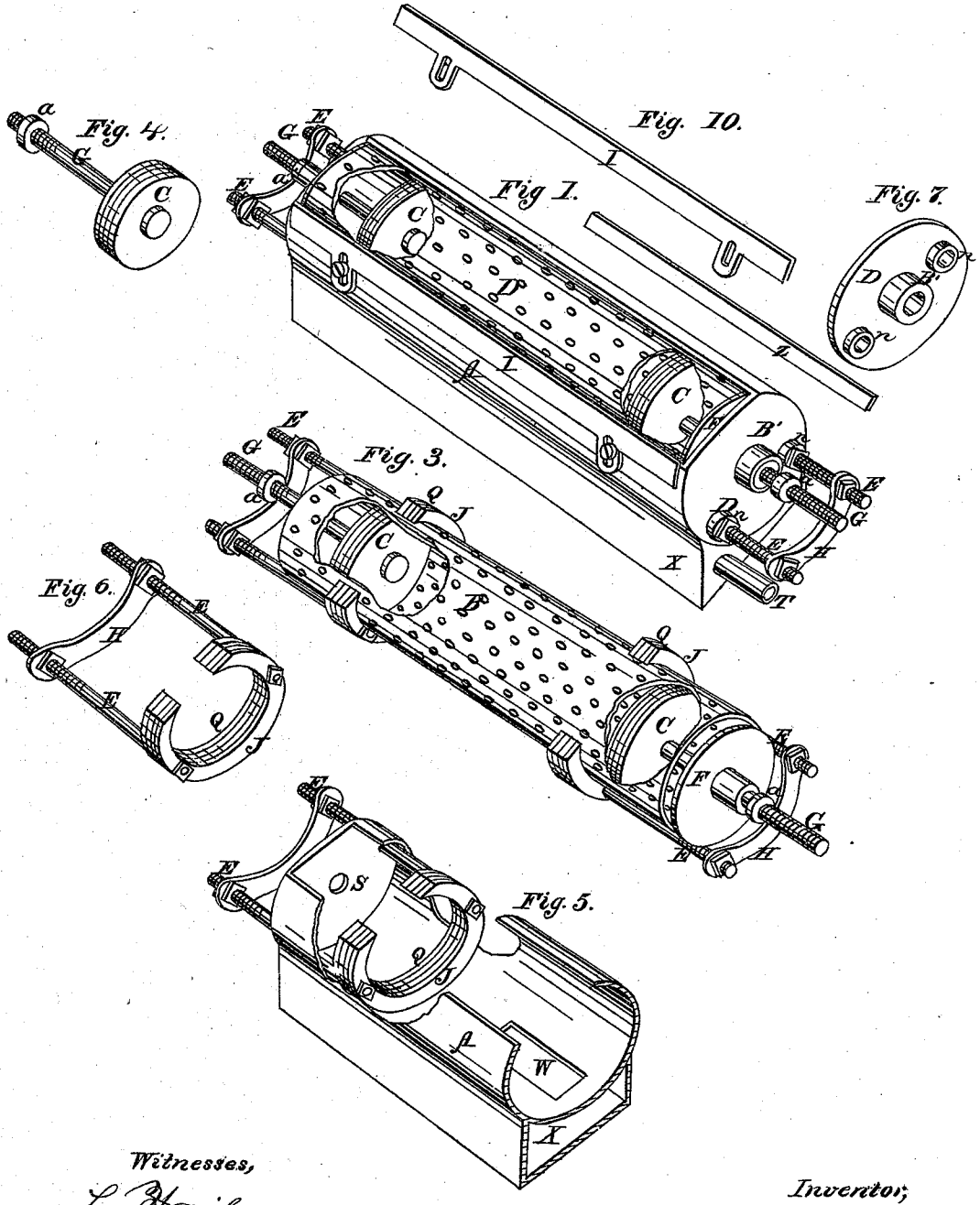
E. T. Ford. Sheet 1. 2 Sheets.

Paper Mach.

No. 83,617. Patented Nov. 3. 1868.



Witnesses,

L. Hailer.

P. T. Dodge.

Inventor;

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E. T. Ford. Sheet 2, 2 Sheets.

Paper Mach

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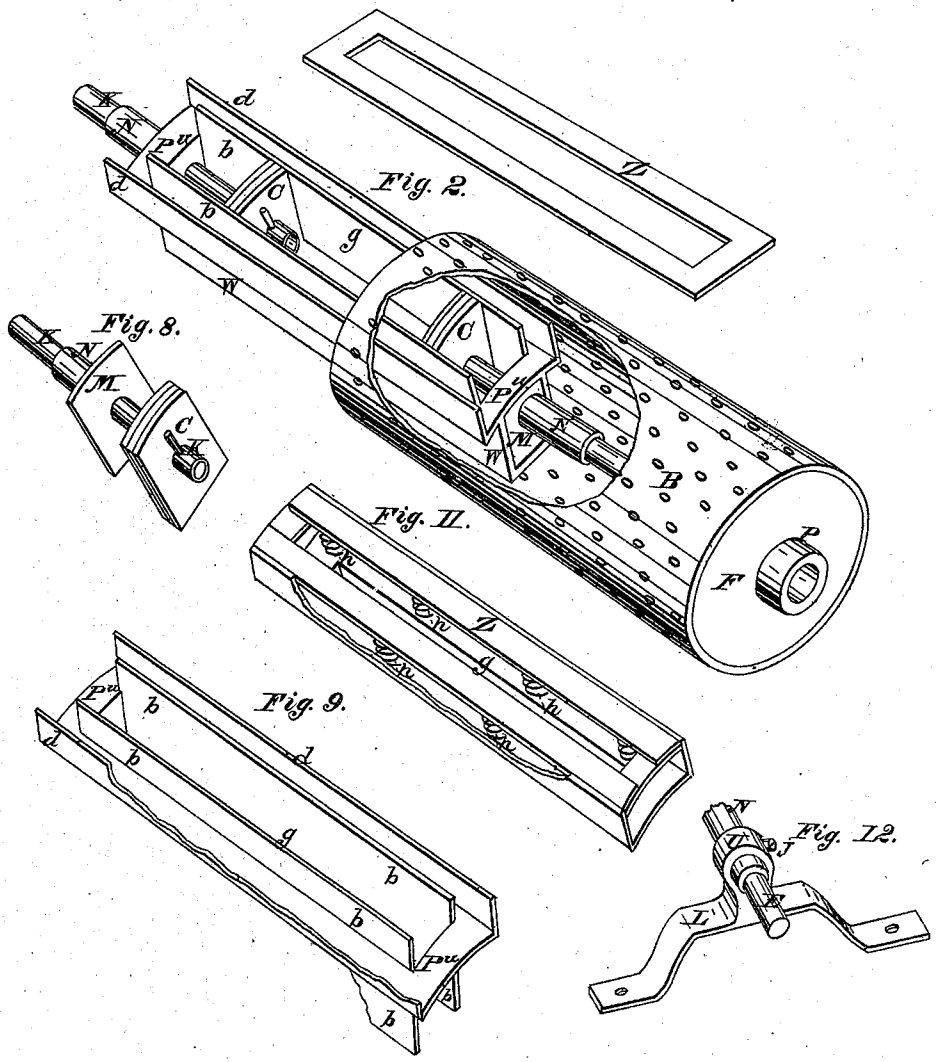

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United States Patent Office.

ELIAS T. FORD, OF STILLWATER, NEW YORK.

Letters Patent No. 83,617, *dated November* 3, 1868.

IMPROVEMENT IN MACHINERY FOR THE MANUFACTURE OF PAPER.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ELIAS T. FORD, of Stillwater, in the county of Saratoga, and State of New York, have invented certain new and useful Improvements in Devices for the Manufacture of Paper; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention relates to machines for the manufacture of paper, and consists in the construction and arrangement of certain and improved mechanical devices for drawing or extracting the surplus water from the pulp while being carried on the endless wire apron to the couching-rolls, as well as for avoiding a large portion of the wear upon the wire apron necessarily attendant upon the ordinary process.

In the drawings—

Figure 1 is a view, in perspective, of my machine;

Figure 2 is a view, in perspective, of a modification of the same machine, with an interior sucking-chamber;

Figures 3, 4, 5, 6, 7, 8, 9, 10 are views, in perspective, of parts detached; and

Figures 11 and 12 are views of parts detached.

In the ordinary process of making paper now in use, the water is sucked from the pulp, as it is carried on the endless wire apron from the vat to the couching-rolls, by square suction-boxes. These boxes draw the endless wire apron down upon its edges with such force as to cause great friction as it passes along. This friction wears out the apron rapidly, making it necessary to renew it every little while. The object of my invention is to secure equally efficient suction without the same wear upon the endless wire apron, and in this way cheapen the cost of manufacturing paper.

I construct a water-box, A, out of any suitable material, and of any desired size and shape, preferring the shape shown in fig. 7. This water-box A, I make with a longitudinal opening at the top, and with a sub-chamber, X, at the bottom, provided with a discharge-pipe, T, as shown in fig. 7.

This water-box A, I provide with an opening, W, as shown in fig. 5, which leads into the sub-chamber X, and the longitudinal edges of the opening on its upper side, I provide with adjustable packing-plates I, arranged so that rubber packing Z may be inserted and held between the plates I and the edges of the opening, and so that the whole may be bound together by set-screws.

Within the water-box A, I mount a perforated cylinder, B, having tubular journals, which enter tubular heads B′, in the ends of the water-box A, and in each end of the perforated cylinder B, and within it I place plungers C. These plungers are composed of two or more disks, with packing between them, and held together with screws and nuts. They are constructed to fit air-tight within the perforated cylinder B, and are attached to solid rods, G, which pass through the tubular journals of the cylinder, as shown in fig. 7.

Between the water-box A and the perforated cylinder B, I place the concave plungers J Q. These plungers consist of two pieces, Q, with packing J between them. They are constructed to fit closely between the sides of the water-box A and the cylinder B, so as to prevent the passage of any air or water. Their ends come up flush with the edges of the opening of the water-box A. There are two of these concave plungers, one in each end of the water-box A, and, in connection with the plungers C, form an air-tight partition. They are provided with two rods, E, which pass through openings, *n*, in the heads of the water-box A, and outside of the water-box they are connected by a bar, H, which serves to hold them parallel, and are also provided with screw-thread and nuts for adjusting these plungers J Q.

The solid rods, G, of the plungers C, outside of the water-box A, I also provide with a screw-thread and nut, *a*, for adjusting the plunger C.

Either of the heads of the water-box A, as well as of the perforated cylinder B, may be made adjustable for the purpose of putting my machine together, or of taking it apart, and the joints must be all provided with suitable packing.

In operating my machine, I adjust the plungers C and the concave plungers J Q, so as to leave the space intervening between them equal in width to the width of the paper to be manufactured, arranging the plungers so as to make continuous partitions at each end of the water-box A and the perforated cylinder B. I then place the machine between the upper and under sides of the endless wire apron, which carries the pulp from the vat to the couching-rolls and forms the sheet. This endless wire apron I allow to rest upon the perforated cylinder B, and to bear lightly upon the packing-strips Z held in place by the packing-plates I. The pulp is then permitted to flow upon the wire apron, so as to cover its top surface, and water is introduced into the water-box A, until it is filled, and the perforated cylinder is nearly submerged. The wire apron is then set in motion. As it moves forward, it causes the perforated cylinder B to rotate. At the same time the air and water are drawn from the space intervening between the heads of the plungers, through the aperture T, by siphon-pipes or other devices suitable for the purpose, which causes the water to be sucked from the pulp, through the wire apron, as it passes over the perforated cylinder B. The water thus sucked out of the pulp, passes down, through the opening W, into the sub-chamber X, and out through the aperture T. During this process I continue to supply

with water the water-box A and the perforated cylinder B at each end, and on the rear side of the plungers, so as to exclude the air.

In this operation, as the wire apron is drawn, in its onward movement, against the perforated cylinder B, it rotates it, and thus prevents friction or wear, and as it bears lightly on the partially-yielding packing-slips Z, it is obvious that the water can be sucked from the pulp without the usual rapid wearing of the wire apron.

The same result I accomplish by a modification of my machine. Instead of partially surrounding my perforated cylinder B with a water-box, A, and using the plungers G and the concave plungers J Q to operate together, as above described, I mount within the perforated cylinder B a suction-box, W, with its ends provided with tubular journals N, which pass through tubular hubs P, in the heads F of the perforated cylinder B. This sucking-box W, I make oblong, and of sufficient length to reach from one end of the perforated cylinder to the other, and with its upper side open, and I so mount it within the perforated cylinder that the edges of this upper side will come in contact with its interior surface, or nearly so, as shown in fig. 2. Around the upper edge of this sucking-box W, and a little below it, I place a packing-plate, P *u*, and on this plate place rubber packing Z, so as to encompass the sucking-box W, and to hug the interior surface of the perforated cylinder B sufficiently close to be air-tight.

Within the sucking-box W, I place two plungers C, one in either end, as shown in fig. 2. These plungers C are made of plates, with packing between, them and shaped to fit closely in the sucking-box W, and to press closely against the part of the perforated cylinder B that may be opposite the open side of the sucking-box, as shown in fig. 2. These plungers are connected to tubular rods, K, which pass through the tubular journals N, in the heads, M, of the sucking-box, and on to the outside of the perforated cylinder B, as shown in figs. 2 and 8. One of the heads of the perforated cylinder I make adjustable for convenience in putting my machine together, and all of the joints or bearings in the heads I make air-tight with suitable packing. The tubular rods K communicate directly with the space *g* between them in the sucking-box W.

If desired, the rubber packing may be held against the interior of the perforated cylinder B, by placing springs *h* between them and the packing-plate P *u*, as shown in fig. 10.

When this modification of my device is used, I mount it in standards L, so that the tubular journals N, connected with the sucking box W, may rest in bearings *o*, and be fastened by a set-screw, *j'*, as shown in fig. 12, and allow the perforated cylinder B, the tubular hubs P of which do not reach the bearings *o*, to rotate freely about the sucking-box W.

This machine, thus constructed, I place, as in the other case above described, between the upper and under sides of the endless wire apron, adjust the plungers C by means of the tubular rods K, so as to make the intervening space between their heads in the sucking-box W to correspond with the width of the paper to be manufactured. As before, the pulp is flowed on to the wire cloth, and with the cloth is carried over the open side of the sucking-box W. At the same time suction is applied to the outer ends of the tubular rods K by siphon-pipes or other convenient devices, which cause the water to be drawn or sucked from the pulp through the wire cloth and perforated cylinder.

In this case, as in the other, as the endless wire apron or cloth moves forward, it is drawn by the suction down upon the perforated cylinder, and causes it to revolve; and as they both move on together, it is obvious that in this case there is not only less friction than in the other, but that nearly all friction is avoided.

Having thus described my invention,

What I claim is—

1. In the manufacture of paper, the method of sucking the surplus water from the pulp formed into a sheet on the wire cloth as it passes to the couch-roll, substantially as herein described.

2. The perforated cylinder B, when constructed and arranged to operate substantially as herein described, for the purpose of avoiding the wear of the wire cloth in the manufacture of paper.

3. The water-box A, perforated cylinder B, circular plungers C, concave plungers J Q, packing-plates I, and packing Z, when constructed and arranged substantially as herein described, and for the purpose set forth.

4. In combination with the perforated cylinder B, the sucking-box W, with its plungers C, when constructed and arranged substantially as herein described.

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