G. DUNN & F. HOLLISTER.

Method and Apparatus for Producing a Vacuum in the Suction-Box of Paper-Machines.

No. 212,362. Patented Feb. 18, 1879.

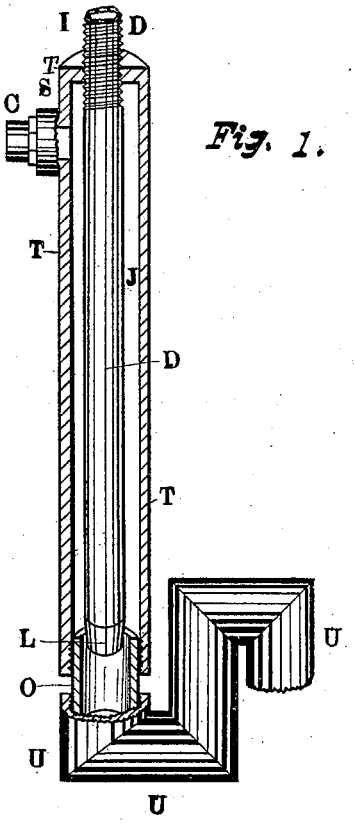

Fig. 1.

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GEORGE DUNN AND FRANK HOLLISTER, OF NORTH WILBRAHAM, MASS.

IMPROVEMENT IN METHODS AND APPARATUS FOR PRODUCING A VACUUM IN THE SUCTION-BOX OF PAPER-MACHINES.

Specification forming part of Letters Patent No. **212,362**, dated February 18, 1879; application filed January 8, 1879.

To all whom it may concern:

Be it known that we, GEORGE DUNN and FRANK HOLLISTER, both of North Wilbraham, county of Hampden, and Commonwealth of Massachusetts, have invented new and useful Improvements in the Methods and Apparatus for Producing a Vacuum in the Suction-Box of Paper-Machines, of which the following is a specification:

The invention relates to the suction-box of an ordinary paper-machine.

Heretofore the vacuum in the suction-box has been obtained by pumping the water and air out with a rotary or piston pump. This method, for many reasons, has been found objectionable; these pumps are run at a very high rate of speed, and are thus subject to great wear; they are often out of order, necessitating the repair of the pump; and the expense occurring by reason of the stoppage of the machine, which is too well known to require description. Again, the pulsations of the pump cause a grinding motion of the "Fourdrinier" wire on the face of the suction-box, thus wearing out the wire-cloth much sooner than would be the case if the pressure were unvarying throughout.

We are aware also that an attempt has been made to use the siphon principle (so called) to produce a vacuum in the suction-box by connecting a water-pipe with the suction-pipe, and allowing water to flow from a reservoir through the pipe into the suction-pipe; but this connection has been an ordinary right-angled connection, and the flowage of the water into the suction-pipe would not produce a vacuum above the point of connection, and it has been necessary to prime the box before a vacuum can be obtained, and whenever, for any reason, the priming is lost, it is necessary to either stop the machine or run broken paper until the box can be again primed; and if there be a leak in the box through which air can pass, or if the pulp be imperfect and the air pass through it, or if a piece of thread or twine pass over the box on the wire-cloth, it will be sufficient to let the air rush in, and the priming is lost; or if the water pass through the wire-cloth into the box faster than it ordinarily would, an overflow of the box is the result. This last difficulty is also found in the vacuum produced with the pump when, for any reason, the pumps do not operate to the capacity requisite. Also a vacuum or partial vacuum has been formed in a vacuum-box by admitting a jet of steam through a vertical tube which withdrew the air from a tube connected with the box. This construction involves the use of intermediate pipes and valves, and has other obvious objections.

The object of our invention is to provide for paper-machines a method and apparatus which, being automatic in operation, will insure a uniform vacuum under all the above varying circumstances, which make the other methods objectionable, and one which is of easy construction and cheap.

The invention consists in the herein-described method of producing a vacuum in the suction-box, and in the general construction and arrangement of the parts of the apparatus, as hereinafter set forth, so that the flowing of a volume of water downward through one pipe, or its equivalent, produces a vacuum in another leading to the suction-box.

In the accompanying drawing, in which similar letters of reference indicate like parts, Figure 1 is a view of our device, showing the outer pipe or case, T, and pipe O in section, with part of the pipe U broken away and in section at the point of connection with the pipe O. The pipe D is shown within the shell T, and the coupling S represents the place of connection for the supply-pipe, while U represents the outlet or waste pipe.

The operation is as follows: The suction-pipe D being connected with the suction-box in the ordinary way, water is admitted through the supply-pipe C to the space J, and flows downward through the opening between the end of suction-pipe D and pipe O into the outlet-pipe U, carrying with it the air and water in pipe D, thus producing a vacuum in the suction-pipe and box. The end L of pipe D is made tapering, as shown in the drawing, for convenience in varying the size of the opening between it and pipe O, and for convenience in adjusting a thread cut on pipe D, at its upper end. The outlet-pipe U is carried upward, as shown, far enough to keep the end L of

pipe D continually in the water, thus preventing the passage of air through it back into the suction-box. The outlet-pipe should be large enough to carry off all the water that will flow into it from the suction-pipe, and through the space between the suction-pipe and pipe O, thus preventing any overflow of water in the suction-box. The operation of this apparatus is automatic, as, when a large amount of water is flowing from the suction-box out of the suction-pipe, a comparatively small amount will flow from the space J through the opening; but when this supply is lessened, a larger amount flows downward from the space J and keeps a complete vacuum in the box.

It will be seen that the same result would be accomplished if the shell T were connected with the suction-box, and pipe D were connected with the supply-pipe. The parts of the apparatus are subjected to no wear, and may be made of any material which will hold water and has the requisite stiffness.

It will also be seen that the exact shape of the parts are not material. For instance, the shell may be made square, or might be simply a tank or box of water; and the suction-pipe may be a pipe of any material, as of rubber or wood, leading into the same; and if the pipes be arranged at the outlet-point, substantially as shown in the drawings or as described, a vacuum will be produced by the outflowing water; or the water may pass from the space J into the suction-pipe through a series of holes of sufficient capacity. We do not, therefore, confine ourselves to this one particular construction or arrangement of parts; but we consider that the best way is to construct the outer shell of three-inch iron tubing, and the inner or suction pipe of one and a half inch iron tubing, and we consider that the best result is obtained by arranging the parts as shown and described.

The combination of an adjustable pipe and an escape-pipe with an air-opening at the terminus of the adjustable pipe is admitted to be old in an aspirator.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of the pipe D with pipes T and O, substantially as and for the purposes set forth.

2. The combination of water-chamber J, or its described equivalents, pipes D and O, or their described equivalents, and pipe U with the suction-box of a papef-machine, substantially as and for the purposes set forth.

3. The combination of suction-pipe D, shell T, supply-pipe C, pipe O, and bent outlet-pipe U, substantially as and for the purpose set forth.

4. The combination, in an apparatus for producing a vacuum in suction-box of a paper-machine, of an adjustable suction-pipe, forming a connection with the suction-box, and arranged within a water-chamber, and an outlet-pipe of larger diameter, whereby the opening between the suction and outlet-pipes can be varied, substantially as described.

5. The method of producing or maintaining a uniform vacuum in the suction-box of a paper-machine, which consists in the flow of a volume of water downward through a confined passage surrounding the suction-pipe leading from the suction-box, substantially in the manner as described.

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