# J. W. Dixon.

## Pulp Digester.

No. 51,571. Patented Dec. 19, 1865.

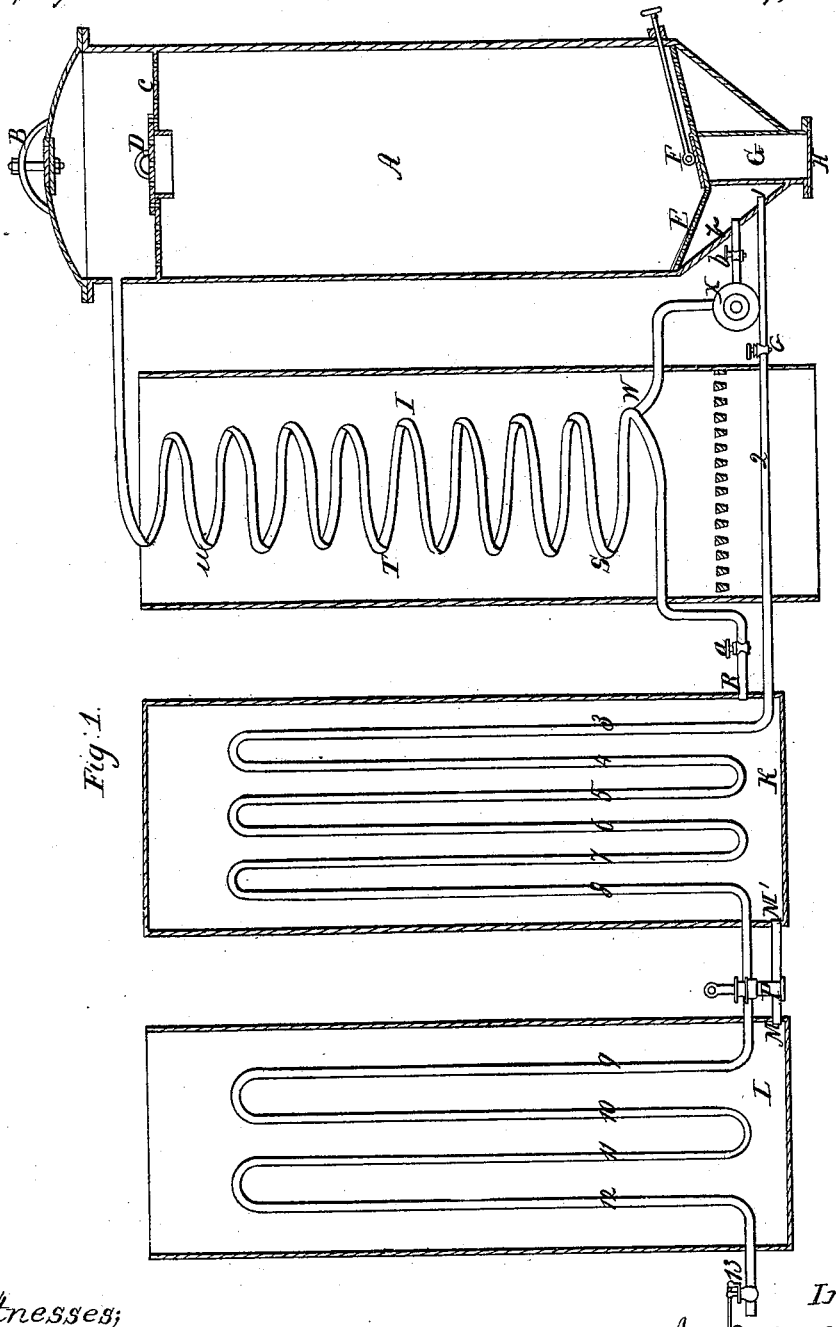


Fig. 1.

Witnesses;
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by his atty
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# UNITED STATES PATENT OFFICE.

JOHN W. DIXON, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN THE MANUFACTURE OF PAPER-PULP.

Specification forming part of Letters Patent No. **51,571**, dated December 19, 1865.

*To all whom it may concern:*

Be it known that I, JOHN W. DIXON, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Making Paper-Pulp from Wood, Straw, and other Fibrous Vegetable Materials; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawing, making a part of this specification, which represents a vertical section of my improved apparatus.

A is the pulp-digester, consisting of a strong boiler capable of resisting from one hundred to four hundred pounds pressure. It has a man-hole, B, on top, an upper perforated diaphragm, C, with a central opening, D, and a lower perforated diaphragm, E, and a central opening, F, and sliding valve connecting with the tube G H, for leading the pulp, when produced, away from the digester.

1 2 3 4 5 6 7 8 9 10 11 12 13 is a continuous coil or tube connected with the lower annular apartment of the digester below the diaphragm E and around tube G. This coil passes through a closed tank, K, and an open tank, L, and through this coil the escaping water passes after having washed out the glutinous and other matters in the mass being pulped.

The tanks L and K communicate by the tube M M′, in which is placed a pump, P. The interior of the tank K communicates by the coil R S T U with the top of the digester A. This coil R S T U is placed in a flue or furnace, I.

From the bottom of the digester A a branch tube, V W, passes, connecting also with the coil R S T U at W.

Another pump is placed at X. A loaded safety-valve is placed at 13 over the extremity of the escape-coil.

The object of this apparatus is to submit wood, straw, and other vegetable fibrous material, while contained within a digester, to the action of water highly heated and under pressure forced to circulate through said material and to pass off constantly with the gummy and other material dissolved in it, and at the same time be replaced continually by highly heated fresh water introduced therein.

The operation is as follows: The digester A having been filled with wood, straw, or other vegetable matter, finely cut up, through the man-hole at the top, the digester is closed securely, the tanks L and K are filled with water, and the pump P is worked until the digester A is filled with water forced in from L to K and from K through the coil R S T U. When the boiler is filled with water the cock *a* is closed and the pump P stopped. The cock *b* is then opened and the pump X is started. This causes the water to circulate from the bottom of A through the coil R S T U onto the top. As the water passes R S T U it is heated by the fire under that coil, and this action is continued until the required pressure is obtained in A—say from one hundred to two hundred and fifty pounds, as may be desired and according to the material to be heated. The cocks A and C are then opened, the pump P started, and the speed of the pump X is checked. The effect of the pump P being started is to force fresh water from L into K and from K through R S T U into the top of the digester, and this causes a corresponding amount of water to pass out through the tube 1 2 3 4 5 6 7 8 9 10 11. The safety-valve at 13 is so loaded as to open only as the pump P forces fresh water into the digester. As the fresh water is forced through L and K it is partially heated by the water passing out through 1 2 3 4 5 6 7 8 9 10 11 12 13, and finally this incoming water is further heated to the required temperature by passing through the heating-coil R S T U. There is also circulated through the same coil, R S T U, at the same time, by the pump X, a portion of the water from the bottom of the digester through the tube L M. The relative proportions of fresh water forced through the heating-coil R S T U into the top of the digester by the pump P and that forced by the pump X to circulate through the same coil from the bottom of the digester onto the top are to be regulated, according to the temperature of the water in the digester, by fixing the relative speed of the pumps P and X. The object is first to force a circulation of fresh water into the digester and force a corresponding portion of the effete water out; and the invention might be advantageously used by omitting the pump X, in which case the circulation would be a forcing of fresh water into the top of the boiler and through the material to be pulped and of refuse water out at the bottom below the material. Simultaneously with this action,

and in addition thereto, if it be desired, I propose to circulate a portion of the highly-heated water from the bottom to the top, in which case the pump X and tube V W must be used. The escaping hot water heats the incoming fresh water.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a pump, P, to force highly-heated fresh water into and through the wood or other material contained in a digester, with a strainer and an exit-pipe for the escape of the waste water at the bottom of the digester strained from the woody fiber.

2. The combination of a pump, P, for forcing heated fresh water into the digester, (containing the material to be pulped by highly-heated water under pressure,) with a coil, R S T U, or equivalent heating apparatus, to heat the fresh water thus forced into the digester.

3. The combination of the pump P, for forcing fresh water into the digester, (containing the vegetable fibrous material to be pulped by highly-heated water under pressure,) with the intermediate heating-boiler K, or its equivalent, in which the fresh water is heated by the escaping effete water from the digester.

4. The combination, with the digester A, of the pump P, for forcing fresh water into and through the material in the digester to be pulped by highly-heated water under pressure, the heating-tank K, or its equivalent, and the coil R S T U, or its equivalent, for further heating the incoming fresh water.

5. The combination of the pump P and the heating-coil R S T U and intermediate tubing, for forcing into the digester heated fresh water, and the pump X, for producing an auxiliary circulation of highly-heated water from the bottom to the top of the digester.

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Witnesses:
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