(No Model.)

J. W. DIXON.

APPARATUS APPLICABLE TO THE MANUFACTURE OF PAPER PULP.

No. 276,162. Patented Apr. 24, 1883.

FIG. 1.

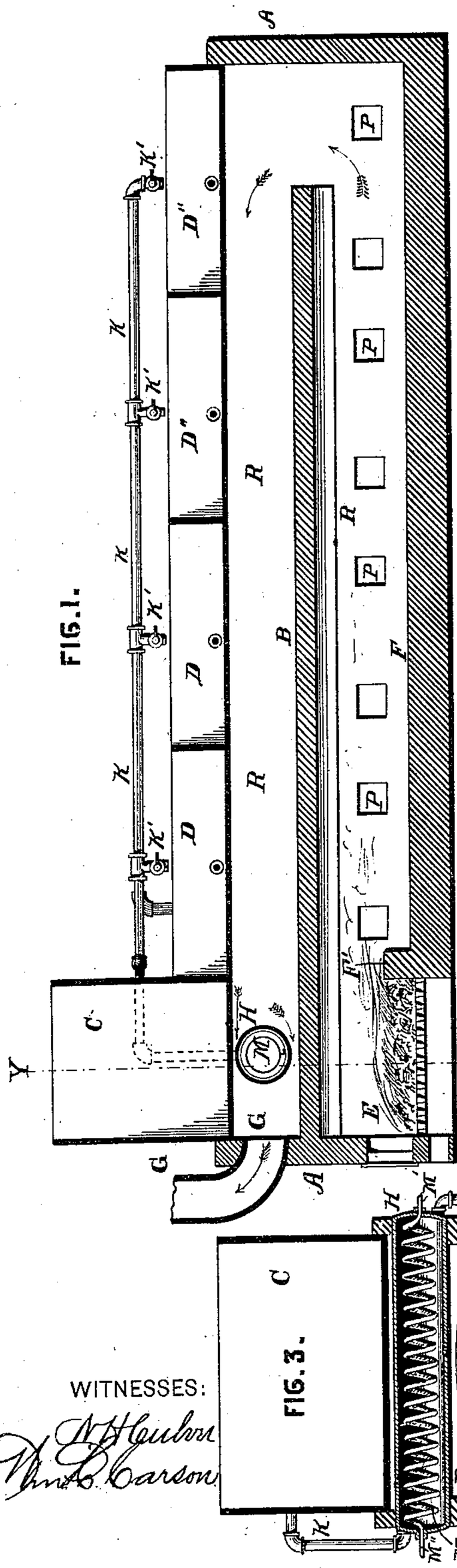

FIG. 2.

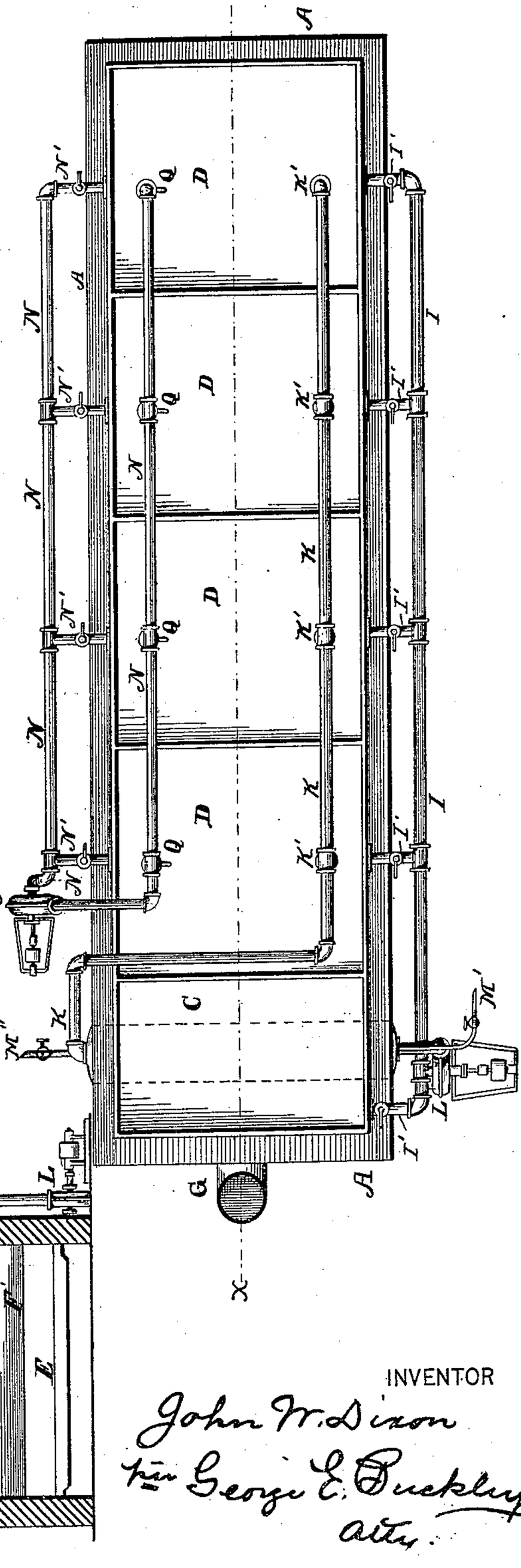

FIG. 3.

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APPARATUS APPLICABLE TO THE MANUFACTURE OF PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 276,162, dated April 24, 1883.

Application filed November 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. DIXON, a citizen of the United States, and a resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Apparatus Applicable to the Manufacture of Paper-Pulp, but most particularly for evaporating and concentrating the waste liquor used in the reduction of vegetable fiber to paper-pulp to recover the soda therefrom; and I hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making part hereof.

The nature of my invention will be fully hereinafter set forth in the description and claims; and its object is to provide an apparatus to accomplish the purpose indicated in its title in an economical and speedy manner.

In the drawings, Figure 1 is a longitudinal vertical sectional view of my device on the line X X of Fig. 2; Fig. 2, a plan view of my device; Fig. 3, a transverse vertical section of the same on the line Y Y of Fig. 1.

A A are the walls of the furnace; B, the arch over the incinerating-hearth; C, the main evaporating-pan, situated over the heat-passage; D D′ D″ D‴, supplemental evaporating-pans, similarly situated; E, the furnace fire-place; F, the incinerating-hearth, upon which the successive charges of partially-evaporated material are finally evaporated to dryness and incinerated; F′, the bridge to prevent the material on the hearth from flowing into the fire-place; G, the passage to the stack; H, a drum or heating-chamber situated in the heat-passage, and connected at one end with the lower interiors of the evaporating-pans by a pipe, I, and its connecting-branches I′ I′ I′, which branches are provided with suitable stop-cocks, as shown in Fig. 2. A fan-pump, L, is located upon this pipe to circulate the liquor. This drum H is furnished at its opposite end with a discharge-pipe, K, which, passing over the pans, discharges into them by means of short nozzles or branches K′ K′ K′ K′. These branches are furnished with suitable stop-cocks, as shown in Fig. 1.

M is a coil of pipe located in the drum H. This coil M is connected at one end, M′, with the steam-space of a steam boiler or generator, and from the other end, M″, to an ordinary trap or pump, to return the condensation to the steam-boiler in the ordinary manner.

N is a pipe connected with the lower interiors of the supplemental evaporating-pans D D′ D″ D‴ by means of short branches N′ N′ N′ N′, the latter being furnished with suitable stop-cocks, as shown in Fig. 2. This pipe N has located upon it a fan-pump, O, to circulate the liquor, and from the opposite side of the pump passes up over the supplemental pans, and is furnished with short branches or nozzles Q Q Q Q, Fig. 2, to discharge into the tops of these last-named pans. The purpose of pipe N, with its pump O, is to circulate the liquor from the bottom of the supplemental pans to the top of the same, to keep the liquor disturbed, and to throw the heated liquor to the top, and allow the cooler top liquor the more rapidly to come into contact with the heated bottoms of the pans.

P P P P are doors in the sides of the furnace to permit the operator to work and stir the mass upon the hearth.

The operation is as follows: The pan C is first filled with the waste liquor from the digester or reservoir, the cock upon the short branch pipe from pan C and those on all the branches of pipe K are then opened, and the pump L is started. The liquor is thus driven through the drum H and through pipe K and its nozzles or branches until the pans D D′ D″ D‴ are charged with liquor as well as the pan C. Fire is then started in the furnace E and all the cocks upon the branches I′ I′ I′ I′ are opened. The liquor will thus begin to circulate from the pump L through drum H, pipe K, into the various evaporating-pans, through nozzles I′ I′ I′ I′ I′, through pipe I, back to the pump again to be again driven forward by the latter, and so on continuously. When the circulation begins steam or hot water is forced through the coil or spiral chamber M, which heats the mass of liquor within and passes through the drum H. At the same time the bottom of the pans are heated by the heat passing from the furnace through the heat-passage R R in the direction of the arrows. (See Fig. 1.) This heat passes around the exterior of

drum H, thus further heating the latter with its inner-contained liquor. Now the cocks N′ N′ N′ N′ and Q Q Q Q are opened and the pump O is also started, thus throwing the liquor in the supplemental pans from the bottom to the tops of the pans, for the purposes above described, and to allow the escape of the heated vapors. After the liquor in the pans has been sufficiently evaporated the mass is let down by any ordinary means—say a pipe furnished with a stop-cock—from the bottom of any one of the pans upon the hearth B, where it is further evaporated by the intense heat and flame of the furnace fire, and it is finally dried and incinerated. As one charge is thus placed upon the hearth more liquor is supplied to the pans, and the operation of evaporating is thus carried on continuously.

I have described locating the drum H in the heat-passage R. This is the best position for it, economically considered; but it may be located in an auxiliary furnace; or, if the steam-coil is considered sufficient to heat the liquor in the drum, the latter may be located outside of the furnace. The waste heat of the furnace is utilized when I place the drum in the heat-passage R, and this was an arrangement exhibited in my Letters Patent of February 27, 1877; but one of the difficulties of exposing the coil containing the liquor to direct furnace heat is that the degree of temperature cannot be controlled; but by making steam or hot water, passed through a conduit, coil, or chamber within the drum H, the principal means of heating the contents of the latter, the temperature of liquor in the drum can be controlled, because the supply of steam or hot water can be regulated by cocks or valves, and all danger of evaporating the liquor to dryness in its passage through the heater or drum H is avoided, thus precluding all chance of coating the inside of the drum with the residuum from the liquor.

Although Fig. 1 is a section on the line X X of Fig. 2, yet for purposes of illustation I have shown the pipe K in this view, thus hiding the upper part of pipe N. In the view Fig. 2 it will be seen that pipe N empties into one side of the pans and pipe K into the other.

What I claim as new is—

1. The combination, with an evaporating-furnace for recovering the soda from the waste liquor used in reducing vegetable fiber to paper-pulp, of an evaporating pan or pans to contain the liquor to be concentrated, a drum, H, with a suitable pipe, I, leading from the evaporating-pan to said drum, and another pipe, K, passing from said drum back to said pan, pump L, located upon pipe I to circulate the liquor, a steam chamber or coil within said drum to heat the contents of the latter, regulated by suitable cocks, and a furnace and incinerating-hearth to finally incinerate the products resulting after concentration, substantially as and for the purposes described.

2. In an apparatus for concentrating the liquor used in reducing vegetable fiber to paper-pulp, as a preparatory step to incinerating the resultant mass to recover the soda therefrom, the pipe N, passing from the lower part of the evaporating-pan and terminating in the upper open part thereof, and a pump, O, located upon said pipe, to throw the liquor from the lower part of said pan into the top part thereof, and a suitable heating device to heat the liquor in said pan during such operation, substantially as described.

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Witnesses:
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