(No Model.)

J. F. PORTER.

EVAPORATING PAN.

No. 304,027. Patented Aug. 26, 1884.

Fig. 1.

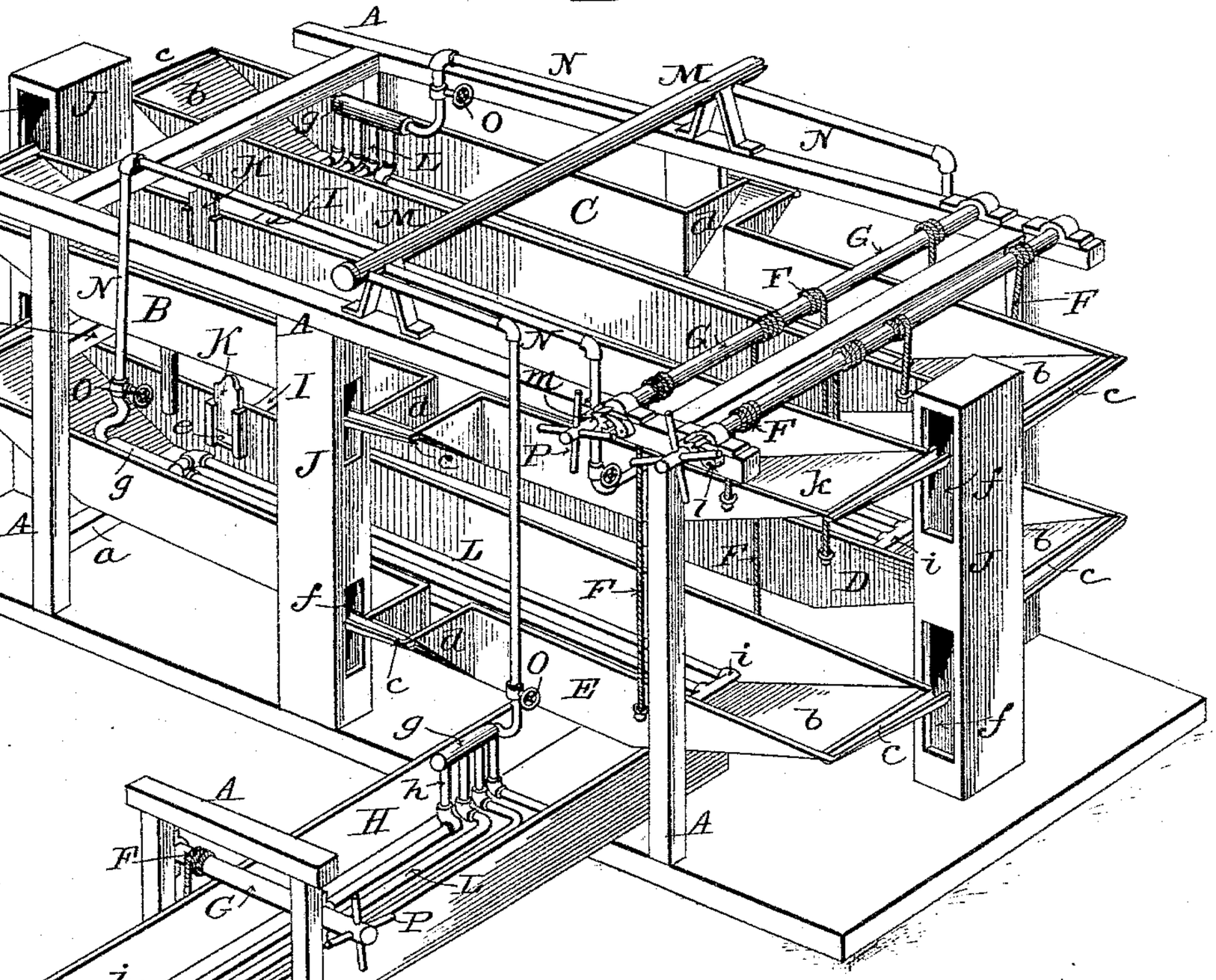

Fig. 2.

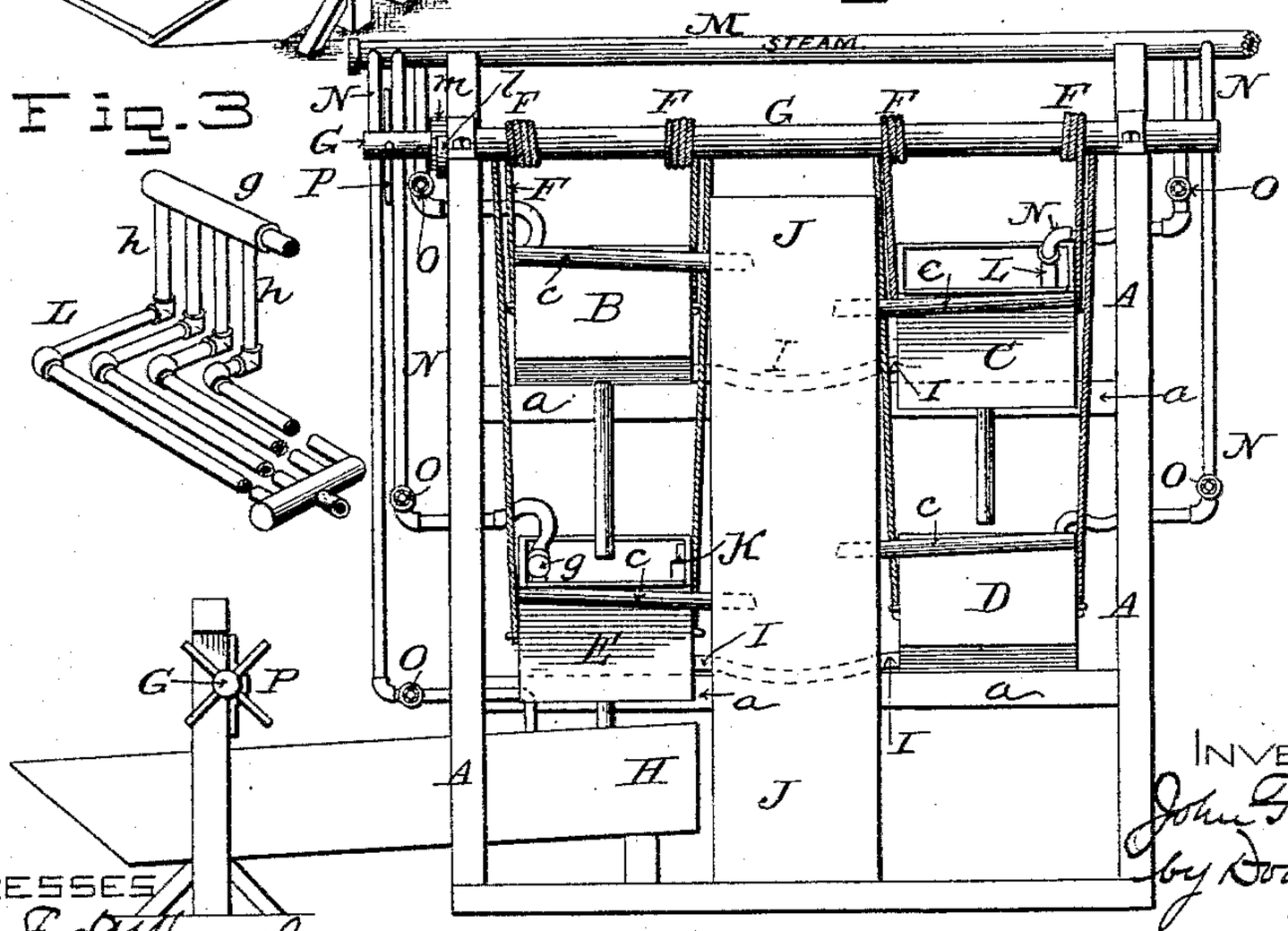

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

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EVAPORATING-PAN.

SPECIFICATION forming part of Letters Patent No. 304,027, dated August 26, 1884.

Application filed February 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. PORTER, of Red Wing, in the county of Goodhue and State of Minnesota, have invented certain Improvements in Evaporating-Pans, of which the following is a specification.

My invention relates to evaporating apparatus for use in sugar-making and like operations, and is designed as an improvement upon that for which Letters Patent of the United States were granted to me bearing date September 18, 1883, and numbered 285,069.

The herein improvement relates more particularly to the manner of mounting the pans, to the mechanism for raising and lowering them to regulate the flow of material, and to the arrangement of steam-pipes by which the sirup is heated.

In the accompanying drawings, Figure 1 is a perspective view of my improved apparatus; Fig. 2, an end view of the same; Fig. 3, a perspective view of the heating-pipes of one pan.

As heretofore commonly constructed the pans or chambers of evaporating apparatus have generally been set at different levels, so that there has been a uniform rate of descent and consequently a regular and unvarying rate of flow, regardless of the condition of the apparatus in other respects, except as such flow was regulated by the valves or gates at the outlets. In emptying the pans, too, where a series of compartments has been employed, it has been necessary to lift the pans bodily, or to permit the sirup to run out through a pipe or opening, which involves a considerable loss of time, and is often attended with an injury of the sirup by reason of too long exposure to the heat. By my present plan these difficulties are avoided and greater convenience of manipulation is secured.

Referring again to the drawings, A indicates a framing of wood or other suitable material, and B, C, D, and E pans or receptacles for the sirup mounted in said frame, one end of each pan resting upon a cross-bar, *a*, of the frame, and the other end being capable of vertical adjustment by the winding or unwinding of chains, cords, or bands F, which are carried about suitable shafts or windlasses, G, at the top of the frame. The drawings show four evaporating-pans thus mounted and a fifth pan, H, arranged to receive the product of the other pans, and in which the finishing operation is performed. The pans B and C and D and E are connected in regular succession by flexible pipes I and outlets *e*, pan B delivering into pan C, pan C into pan D, and pan D into pan E, which finally discharges through a like flexible pipe, I, into finishing-pan H. The number of pans may be increased or diminished, as required; but whatever number be employed each will be somewhat higher than the next succeeding, so that there shall be a regular descent and consequent flow or circulation when working normally. The connecting-pipes I are located just over or close to the cross-pieces *a*, upon which the fixed ends of the pans rest, so that in adjusting the pans the relative heights of the receiving and discharge ends of the pipe shall not be materially altered. In practice I find it desirable to place each pan two inches below the preceding, or thereabout, and to carry the connecting-pipe in a horizontal line from the lower point of the higher pan directly into or through the side of the next, thus giving two inches' fall and avoiding any clogging of the outlet. Each pan is formed with two inclined ends or spouts, *b*, which project horizontally about two or two and a half feet beyond the horizontal bottom of the pan, and are each furnished with a gutter or trough, *c*, to receive the scum which flows over the end of the spout. Each pan is further provided with a side spout, *d*, of the same form as the spout *b*, and furnished with a like gutter or trough, *c*, to receive and carry off the scum which flows into the spout. It will of course be understood that the inner sides of the troughs or gutters *c* are somewhat lower than the side walls of the pans, so that the scum which rises to the surface may flow into the troughs without overflowing the sides of the pans. The troughs or gutters *c* extend through openings *f* into upright trunks or boxes J, whence it may be conducted to any desired point. Each pan may be provided with an independent windlass, G, and chains or bands F, if desired; but as it is usually necessary to adjust the first and second or the third and fourth at the same time, and to give each the same inclination, one roller or windlass may serve for two pans, or even for the entire series, by winding the cords, chains, or

bands in opposite directions about the windlass, so that as one is raised another shall be lowered, or so that the entire series shall be raised and lowered alternately, as is required where the supports are all at one end of the frame. Each windlass is furnished with a hand-wheel, P, pawl *l*, and ratchet *m*, to operate and hold them. Each pan is furnished with a gate, K, to open or close the outlet *e*, through which the juice or sirup passes into the connecting-pipe I, through which it flows to the next pan, so that it may be held for any desired length of time under the treatment given in any particular pan, as is usual in this class of apparatus. Within each pan is placed a steam-coil, L, of the form shown in Fig. 3, consisting of a head, *g*, and a series of vertical pipes, *h*, which stand against the side of a pan, near one end, as in Fig. 1, passing to the bottom of the pan and extending directly across said bottom to a proper point in the width of the pan, and finally passing along the bottom, parallel with the sides, to or nearly to the opposite end, where the several pipes are again connected by a head, *i*, as shown. This arrangment is important, because the pipes extending lengthwise of the pan do not impede the flow of the juice or sirup, and the upright pipes are kept out of the way, leaving the entire pan free and open for skimming and other operations. Steam is supplied to each coil from a common supply-pipe, M, by branches N, each furnished with a valve, O, to control the quantity going to the several coils or to cut it off entirely from any one or more. The head *i* of each coil is furnished with an outlet, *j*, for the exhaust-steam and water formed by condensation. The outer pipe may be carried out through the bottom, side, or top of the pan. The coil will be connected with the branch steam-pipes N by flexible pipes, or in an equivalent way, to permit the rise and fall of the coils with the respective pans.

As shown in Fig. 1, the finishing-pan H is set at right angles to the other pans, in order that the attendant may readily pass about it for performing any required operation. The pan H is furnished like the others with a steam-coil. In practice I find it advantageous to carry the coils within about six inches of each end of the bottom of the pans, leaving the remaining space clear for the ready outlet of the juice or sirup. The arrangement of the coils above described provides for free expansion and contraction of the pipes without danger of straining the joints. Pan H is furnished with bands F and windlass G, the same as the other pans.

The operation of the apparatus is as follows: The juice is delivered by pan B, at the point K, through a pipe or otherwise, and flows along the bottom of the pan to its rear end, the pan being slightly inclined in that direction, if necessary. From pan B the juice flows into the pan C through pipe I, at such rate as permitted by the gate K, and in like manner it flows to D and E, and finally enters pan H. The juice is detained in each pan as long as the attendant deems necessary, the heat being regulated for each pan independently by the valves O. In this way the juice is brought gradually to the precise condition required. If it be desired to hasten the flow of the juice, the pans are inclined downward in the direction of the flow by means of the windlasses, as above explained. When the sirup is finished the outer end of the pan H is lowered and the sirup is permitted to flow out into suitable receptacle.

The apparatus is simple and cheap in construction and capable of easy manipulation.

I am aware that an evaporating apparatus has been constructed in which the "settling-pans" were suspended by cords, and raised and lowered bodily to deliver into different pans, and this I do not claim, broadly. In my plan the boiling-pans rest at one end upon a fixed support, and are tipped or inclined by cords, in order to cause the material to flow in the desired direction, suitable flexible connections being provided to allow for the varying positions of the pans. Neither do I claim anything shown or described in my former patent, hereinbefore referred to.

Having thus described my invention, what I claim is—

1. In an evaporating apparatus, an evaporating-pan mounted at one end upon a fixed support, and provided at its opposite end with means, substantially such as described and shown, for raising and lowering said opposite end and holding it at any required elevation.

2. In an evaporating apparatus, the combination of a pan provided with a steam-coil, a steam-supply pipe, and an intermediate flexible or yielding connection, substantially as described, whereby the pan and its coil are adapted to rise and fall without straining the connections between the coil and the supply-pipe.

3. In an evaporating apparatus, the combination of two or more pans mounted upon a flexible support at one end, and provided with means, substantially as shown and described, for independently raising and lowering their other ends, a flexible pipe connecting the two pans, whereby the independent adjustment of the pans is permitted to take place.

4. In an evaporating apparatus, the combination of a series of independent pans, arranged, substantially as described, to deliver successively one into the other, and a finishing-pan placed at right angles to those of the series from which it is supplied, whereby a free space is afforded about the finishing-pan to permit the attendant to perform the necessary operations.

5. In combination with pans B C and support *a*, windlass G, and bands F, wound in reverse directions upon said windlass and independently connected with the respective pans,

whereby rotation of the windlass is caused to elevate one and lower the other pan.

6. In combination with an evaporating-pan, a heating-coil composed of a series of connected pipes all extending vertically down one side of the pan, thence at a right angle across the bottom of the pan each to a suitable point in the width thereof, and thence along the bottom of the pan, parallel with its sides, to or nearly to its opposite end.

7. The herein-described evaporating apparatus, consisting of frame A, provided with support *a*, pans B C D E, bands F, windlass G, and finishing-pan H, all substantially as described and shown.

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Witnesses:
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