(No Model.) 2 Sheets—Sheet 1.

S. E. SPROUT.

FRUIT EVAPORATOR.

No. 418,079. Patented Dec. 24, 1889.

Fig 1.

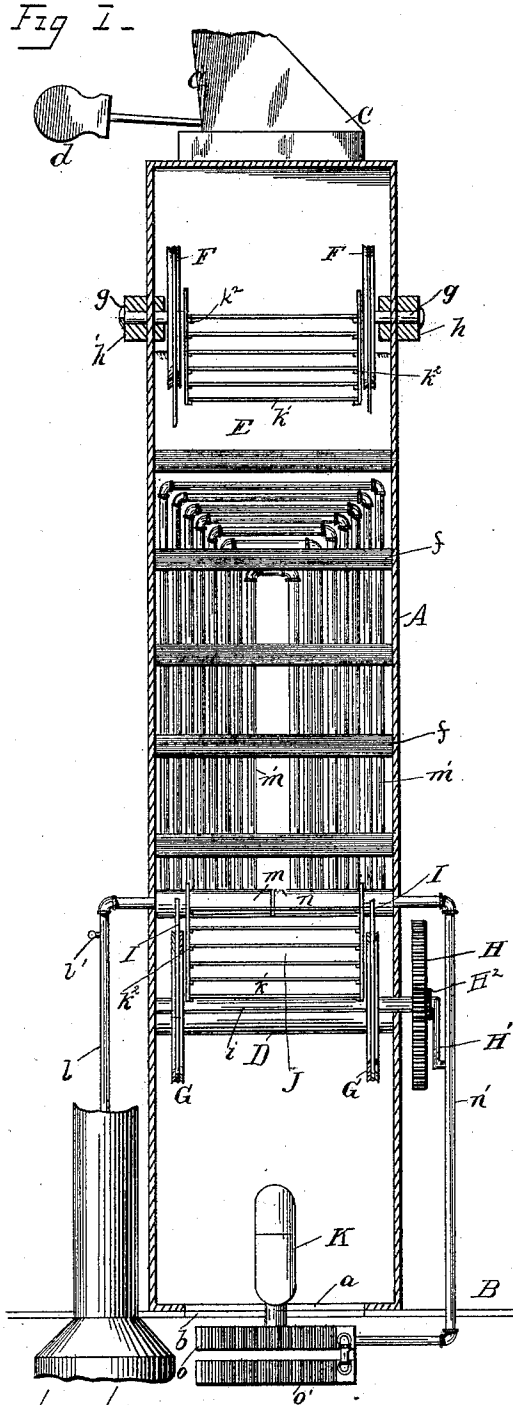
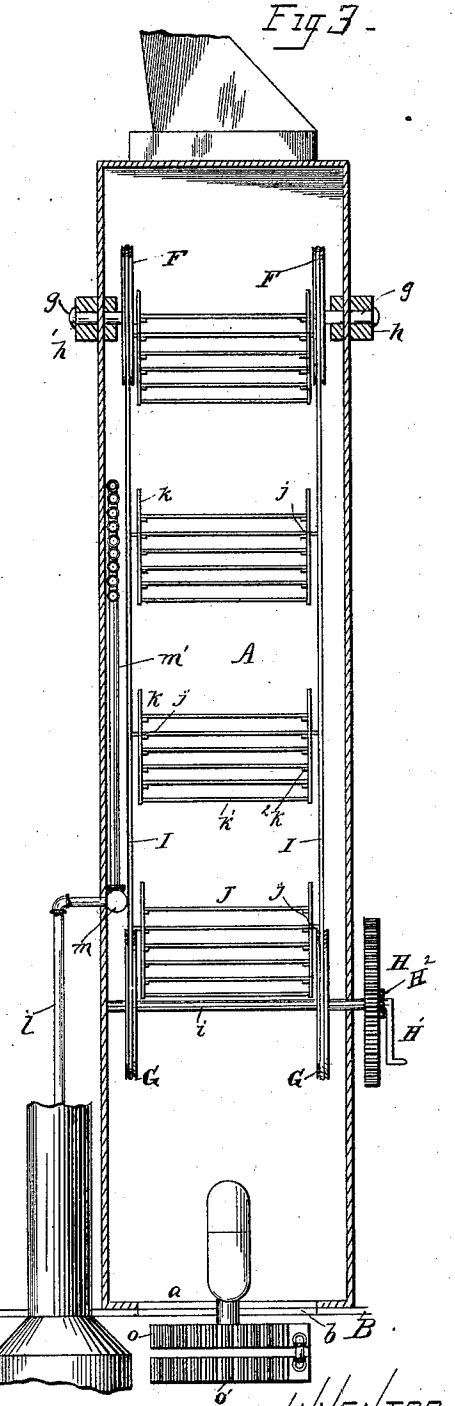


Fig 3.



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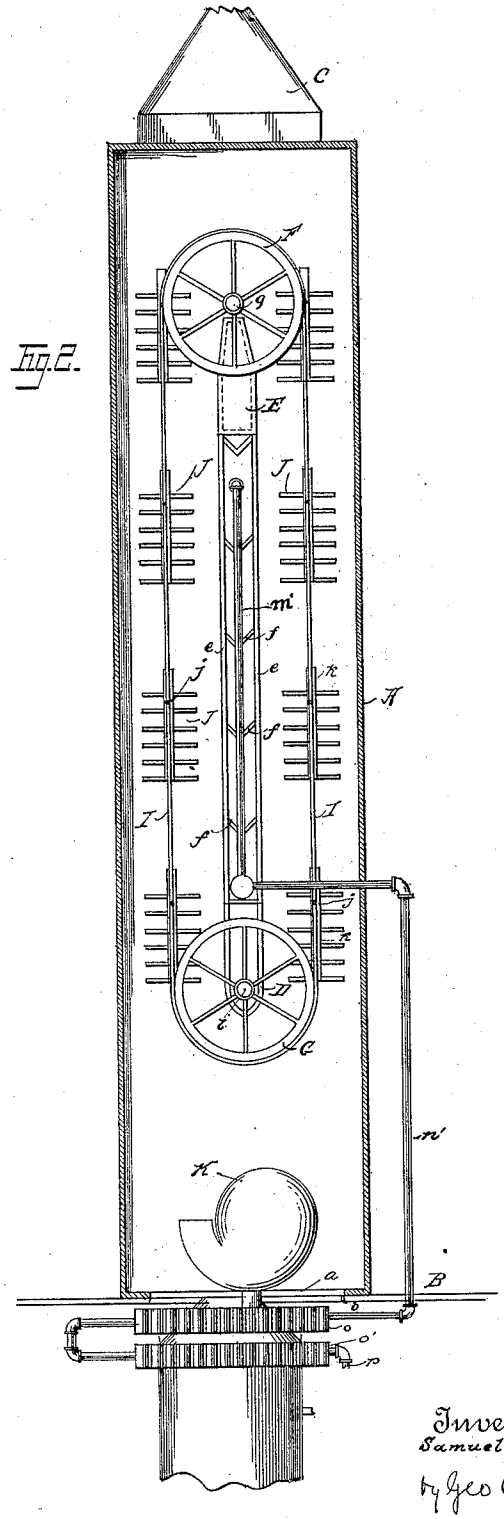
(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

SAMUEL E. SPROUT, OF MUNCY, PENNSYLVANIA.

FRUIT-EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 418,079, dated December 24, 1889.

Application filed May 9, 1888. Serial No. 273,333. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. SPROUT, a citizen of the United States, residing at Muncy, in the county of Lycoming and State of Pennsylvania, have invented certain new and useful Improvements in Fruit-Evaporators; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to various new and useful improvements in fruit driers or evaporators, and also to the method of heating the air within the same and of maintaining a rapid circulation of the air; and it is the object of my invention to provide a compact, durable, simple, and extremely efficient evaporator, one capable of being transported and easily erected, one in which the heat may be economically maintained with but little attention on the part of the operator, and one in which the temperature may be regulated with certainty.

The principal novelties of my invention consist of a tower or trunk located within a suitable building and projecting above the roof of the same, and within which endless chains carrying trays containing the fruit to be evaporated are made to revolve around suitable pulley-wheels located near the top and bottom of the tower or trunk, a hollow semi-partition inside of the tower, steam-radiating pipes arranged vertically inside of the tower, whether inside of said partition or otherwise, and a boiler or other source of steam-supply arranged adjacent to the tower or trunk and supplying steam to the radiating-pipes, as well as in other but less important minor details of construction, all as will be more fully hereinafter described and claimed.

In order that others may understand my invention, I will now describe it, attention being had to the accompanying drawings, wherein similar letters have reference to identical parts in the several views, and in which—

Figure 1 is a vertical sectional view of the entire apparatus; Fig. 2, an elevation of the same with one side removed; Fig. 3, a side section showing the radiating-pipes as being arranged on the side of the tower.

A represents the tower or trunk, made of wood or any other suitable material, suitably braced and strengthened, and of a rectangular form, as shown, its greatest dimension being its height vertically from top to bottom. This tower or trunk is adapted to firmly rest on the floor B of a building, and is provided at its bottom with a large opening *a*, the floor B being provided with a corresponding opening *b*. The top C of the tower is made preferably peaked, and situated upon and firmly secured to this top is a ventilator C′, of any suitable construction, it being preferable, though not essential, to provide the same with a vane *d*, by means of which the opening in the side of the ventilator, which should be of the rotating variety, may be kept always away from the direct path of external air-currents, thereby preventing such air-currents from entering the interior of the tower or trunk.

At a point somewhat above the lower end of the tower, and with its upper portion extending from one wall of the tower to the other wall directly opposite, is a partition D, made preferably pointed at its lower end, and vertically above this partition D, and situated at a point near the upper end of the tower, is another partition E, and with its lower portion also extending from one side wall of the tower to the other wall directly opposite, and thereby firmly retaining its position. Connecting these two partitions, and thereby serving to brace the same securely, are the rods *e e*, made preferably of wood, though it will be apparent that other materials might be advantageously substituted. Arranged at suitable intervals along these braces *e e*, and made preferably of wood, are the deflecting-plates *f f*, inclining somewhat upwardly and extending inwardly to the radiating-pipes, to be described hereinafter.

Directly above the partition E, and keyed securely on suitable short axles *g g*, passing through the walls of the tower and entering the journal-boxes *h h′*, are the pulley-wheels F F, made preferably of metal, and of such a construction to be as light as possible and still be consistent with the strength required.

Passing through the partition D and the side walls of the tower is an axle *i*, and keyed or otherwise fastened to this axle are the pul-

ley-wheels G G, occupying the space formed between the lower portion of the partition D and the walls of the tower. Fastened onto one end of the axle *i* is a large gear-wheel H, and engaging with this wheel and adapted to be operated by a crank H′ is a pinion H″, made very much smaller in diameter than the gear-wheel, and thereby obtaining a powerful leverage. Connecting and passing over the grooves in the circumference of the pulley-wheels F F′ G G′ are the endless chains I I, made of metal and of any well-known construction. At regular intervals on each chain are securely fastened the pins *j j j j j*, the position of each corresponding exactly on both chains, and these pins pass entirely through the side brace *k k* of each tray-hanger J J, near the top thereof, so that each hanger is supported pendulum-like from one pin on each chain. The side braces *k k* of each hanger are securely connected both at the top and bottom by means of connecting-braces *k′ k′*, and securely fastened at regular intervals on each side brace *k k* are the slides k^2 k^2, for holding the perforated trays containing the fruit to be evaporated. It will now be seen that by turning the crank H′ the pinion H^2 will transmit its motion to the large gear-wheel H, which will revolve slowly, turning the axle *i* and the pulley-wheels G G with it. The friction of the chains I I on these pulley-wheels will be sufficient to carry them around with the motion of the periphery of the wheels, and consequently the chains and tray-hangers thereon will be carried up and over the pulley-wheels F F, passing up one side of the partitions D and E and down the other.

Directly beneath the floor B is situated a boiler of any well-known construction, it being safer as well as more economical to use one of the low-pressure type, and in order that the evaporator may be operated with as little labor as possible this boiler should preferably be one of the "self-feeding" variety. Passing up from this boiler through the floor B and entering the tower A at a point directly above the partition D and between the two rows of tray-hangers is a steam-conducting pipe *l;* and in order that the supply of steam passing through this pipe, and consequently the temperature of the evaporating columns of air, may be regulated, a globe or other suitable valve *l′* is interposed in said pipe near the point of its entrance into the tower. The pipe *l*, after passing into the tower A, enters the hollow metallic drum *m*, held securely in position directly above the partition D and between the connecting-rods *e e*, and from which the radiating-pipes *m′* extend. These pipes *m′* are also located between the braces *e e* and extend vertically upward to a point near the partition E, as shown, and then out at right angles to the original course, and then at right angles thereto and parallel with the original course, in which latter direction they extend downward to and enter the drum *n*, secured in line with the drum *m* and fastened in a similar manner. Extending out from the drum *n* and passing through the wall of the tower is another pipe *n′*, which continues vertically downward, passes through the floor B, and enters the radiators *o o′*, made preferably of cast-iron and communicating with each other. These radiators *o o′* are situated directly beneath the opening *b* in the floor B, and are connected to the boiler by means of the pipe *p*, so that there will be, as shown in the drawings, a complete uninterrupted circulation through the pipe *l*, drum *m*, radiating-pipes *m′*, drum *n*, pipe *n′*, radiators *o o′*, and pipe *p*, beginning and ending at the boiler. The position of these conducting and radiating pipes, drums, and radiators may be changed and varied in many ways (for instance, as in the construction illustrated in Fig. 4, in which the radiating-pipes are shown as being arranged on the sides of the tower) without departing from the spirit of my invention, which consists, essentially, in arranging the radiating-pipes vertically in the interior of the tower.

In order that the circulation of air through the tower may be sufficiently rapid, it might be advisable, though not absolutely necessary, to station a fan K at the lower end thereof, which fan may be driven by any suitable means, preferably by gearing connected with the crank H′.

The pulley-wheels G G F F may be dispensed with and sprocket-wheels substituted, care being taken, however, to have the projections on the sprocket-wheels of such a shape and of such a distance apart as will exactly coincide with the links of the endless chain I I.

Instead of using the crank N′, the gear-wheel H might be operated by a small low-pressure engine supplied with steam from the boiler and situated at any convenient point on or near the tower. Such an engine would not add much to the preliminary expense, and would by its use render the device practically automatic.

By using the short axles *g g*, and thereby dispensing with a continuous one for the wheels F F, I effectively prevent any liability of the tray-hangers becoming engaged with such an axle and upsetting, as frequently happens in some of the driers now used in which revolving trays are employed, and, further, I am enabled to use much longer and more commodious tray-hangers, when compared with the size of the wheels F F, than are at present used.

The mode of operation of my device is as follows: The trays are spread evenly with layers of fruit to be evaporated and are inserted in the tray-hangers. Steam is now generated in the boiler and circulates through the pipes and radiators, as before described, the radiators *o o′* heating all the air around them, which, as well known, will rise and pass up through the tower on each side of the par-

titions, and the radiating-pipes *m m* will heat the surrounding air, which, being reflected by the plates *f f*, will also pass up through the tower on each side of the partitions and out through the ventilator. After the circulation of the hot air up through the tower has been established, and which can, if needed, be augmented by the before-described fan, the crank H′ is rotated, operating as set forth, and the tray-hangers are made to pass up one side of the partitions and down the other, one side of the trays being heated while ascending by the deflected hot air from the radiating-pipes, and the other side of the trays being heated while descending in a similar manner, the moisture from the fruit being first driven off by the hot air from the radiators *o o′* when the trays are near the lower end of the tower. This operation is maintained until the fruit is thoroughly evaporated, which can be determined by any one acquainted with the business.

It is evident that the same arrangement of vertical pipes may be used with hot air or hot water, but to less advantage.

I do not wish to be confined to the evaporation of fruit only, because my device is equally applicable to the evaporation of other products besides fruit—for instance, corn, &c.

Having now described my invention, what I desire to secure by Letters Patent is—

A fruit-evaporator consisting of a vertical tower having a cowl C at its upper end and with an opening *a* at its lower end, wheels G G, mounted within said tower near its lower portion, gear-wheels H H and crank H′ for rotating said wheels G G, wheels F F, mounted on separate axles within the tower, near its upper end, tray-hangers J J, pivoted to flexible bands or chains passing over the peripheries of said wheels G G and F F, partitions E and D within the tower, drums *m n* directly above the partition D, radiating-pipes between said partitions and connecting the two drums *n* and *m*, deflecting-plates *f f* on each side of said radiating-pipes, connecting-pipe *n′*, connecting the drum *n* with a pair of radiators *o o′* beneath the opening *a*, a boiler connecting with said radiators and with the drum *m*, and a rotary fan K directly above the opening *a*, all combined and arranged substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL E. SPROUT.

Witnesses:

JAS. H. ROOKER,

H. N. LAIRD.