J. R. POND.

Apparatus for Concentrating Milk.

No. 42,398. Patented April 19, 1864.

Fig: 1.

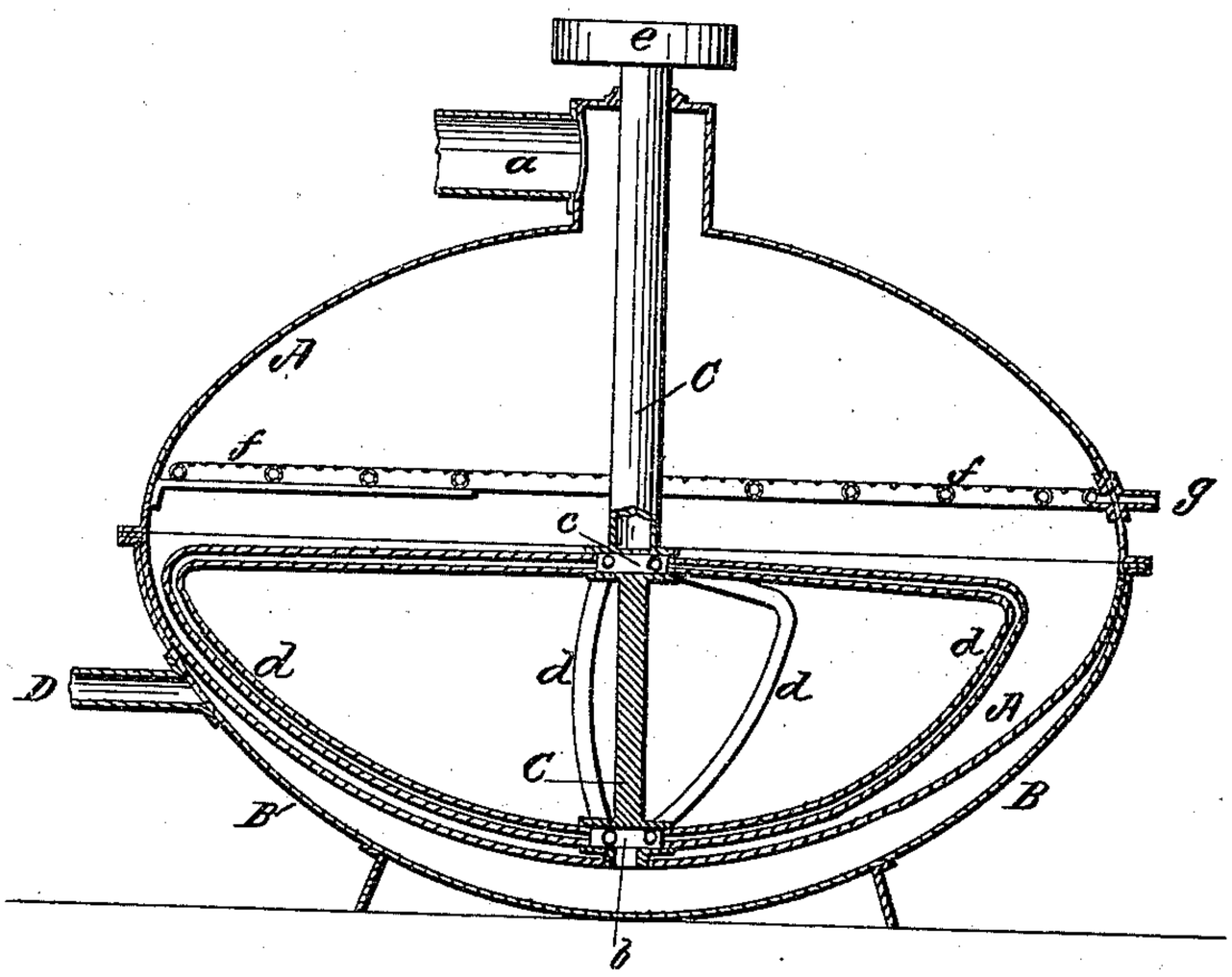
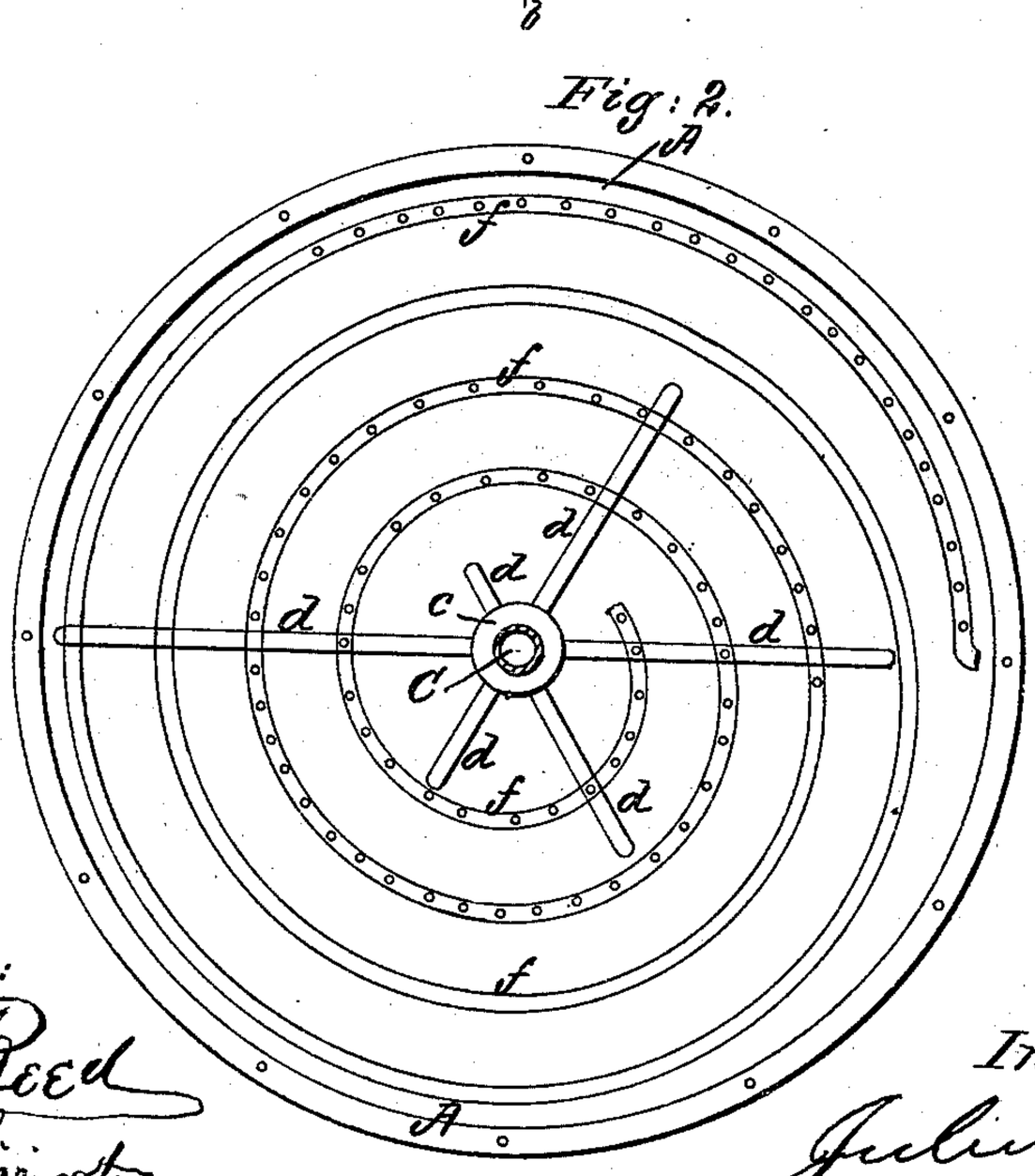


Fig: 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

JULIUS R. POND, OF NEW HARTFORD, CONNECTICUT.

IMPROVEMENT IN APPARATUS FOR CONCENTRATING MILK, &c.

Specification forming part of Letters Patent No. **42,398**, dated April 19, 1864.

To all whom it may concern:

Be it known that I, JULIUS R. POND, of New Hartford, in the county of Litchfield and State of Connecticut, have invented a new and useful Improvement in Condensing or Concentrating Milk or other Substances by Evaporation; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of an evaporating apparatus illustrating my invention. Fig. 2 is a horizontal section of the same.

Similar letters of reference indicate corresponding parts in the two figures.

This invention consists in condensing or concentrating milk or other liquid substances by evaporation produced by the combined effects of the application of steam heat below the surface, the application of currents of hot, dry air above the surface, agitation, and the connection of the evaporating-vessel with a chimney or other means of producing a draft, whereby I am enabled to effect the condensation or concentration very rapidly at a comparatively low temperature and at a small expense.

To enable others skilled in the art to apply my invention to use, I will proceed to describe it with reference to the drawings.

A is the evaporating-vessel, covered and closed, except that at the top it has a communication with a chimney or other apparatus for producing the draft by means of a pipe or flue, *a*, or other means.

B is a steam-jacket incasing the bottom and lower parts of the sides of the vessel A.

C is an upright shaft passing centrally and vertically through the vessel A, its lower end being received in a stuffing-box in the center of the bottom of the said vessel, and its upper part passing through the cover of the same and working in a guide provided in or above the said cover. The said shaft is constructed or furnished in any suitable manner near the bottom with a cavity, *b*, which forms a steam-box, and which is always in communication with the steam-space between the pan and the water-jacket, as shown in Fig. 1. At some distance above this steam-box the shaft is furnished with another steam-box, *c*, which is connected with the lower box, *b*, by means of a number of curved steam-pipes, *d d*, but which has no other communication with the latter box. These pipes are of different lengths, so that as the shaft revolves they may pass through different parts of the body of milk or other liquid in the vessel A. Above the cover of the vessel the shaft is furnished with a pulley, *e*, or gear to enable it to have a rotary motion imparted to it.

D is a pipe from a steam-boiler to supply the jacket B with steam. The box *b* is supplied with steam from the jacket through the open bottom of the shaft, and the steam is supplied from the said box *b* through the pipes *d d* to the upper box, *c*, the two boxes and the pipes all forming heating-surfaces. The water resulting from condensation in the pipes and boxes and in the jacket collect in the bottom of the jacket and pass off through a steam-trap. (Not shown.)

Above the upper steam-box, *c*, there is situated a stationary coil of pipe, *f*, which is connected with a pipe, *g*, outside of the vessel, with any suitable apparatus for supplying heated air. This coil has its upper side perforated with numerous fine holes, or has a very narrow slit extending its whole length to deliver the air above the surface of the milk.

The operation of the apparatus is as follows: The vessel having been filled with the milk or other liquid to be evaporated high enough to cover the upper steam-box, but not quite up to the coil *f*, steam is let into the jacket, heated air forced into the pipe *f*, and rotary motion is imparted to the shaft C. The liquid is heated below the surface by means of the jacket and by the steam-boxes *b c* and pipes *d d*, being in the meantime stirred and agitated by the revolution of the pipes *d d*, so that its contact with the steam-heating surfaces is constantly changed and every portion of it is brought in contact with such surfaces. The dry hot air admitted by the pipe *f* rapidly absorbs the moisture from the milk, and also absorbs the vapors eliminated by the heat of the steam, and the draft at the pipe or flue *a* rapidly carries off the vapors and moistened air.

I do not claim to be the first to evaporate milk by the combined action of a steam-jacket

to heat the milk and heated air to carry off the vapors, being aware that this has before been accomplished. In my apparatus great advantage results from the combined use of the steam-pipes *d d d* of unequal length, for stirring and heating the milk uniformly in all parts, and the perforated helical pipe *f*, for discharging heated air uniformly over the entire area of the vessel.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the rotating curved pipes *d d d* of unequal length, for stirring and heating the milk, a perforated helical pipe, *f*, for distributing heated air over the entire area of the vessel, and an eduction-pipe, *a*, all substantially as herein described, and for the purpose specified.

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