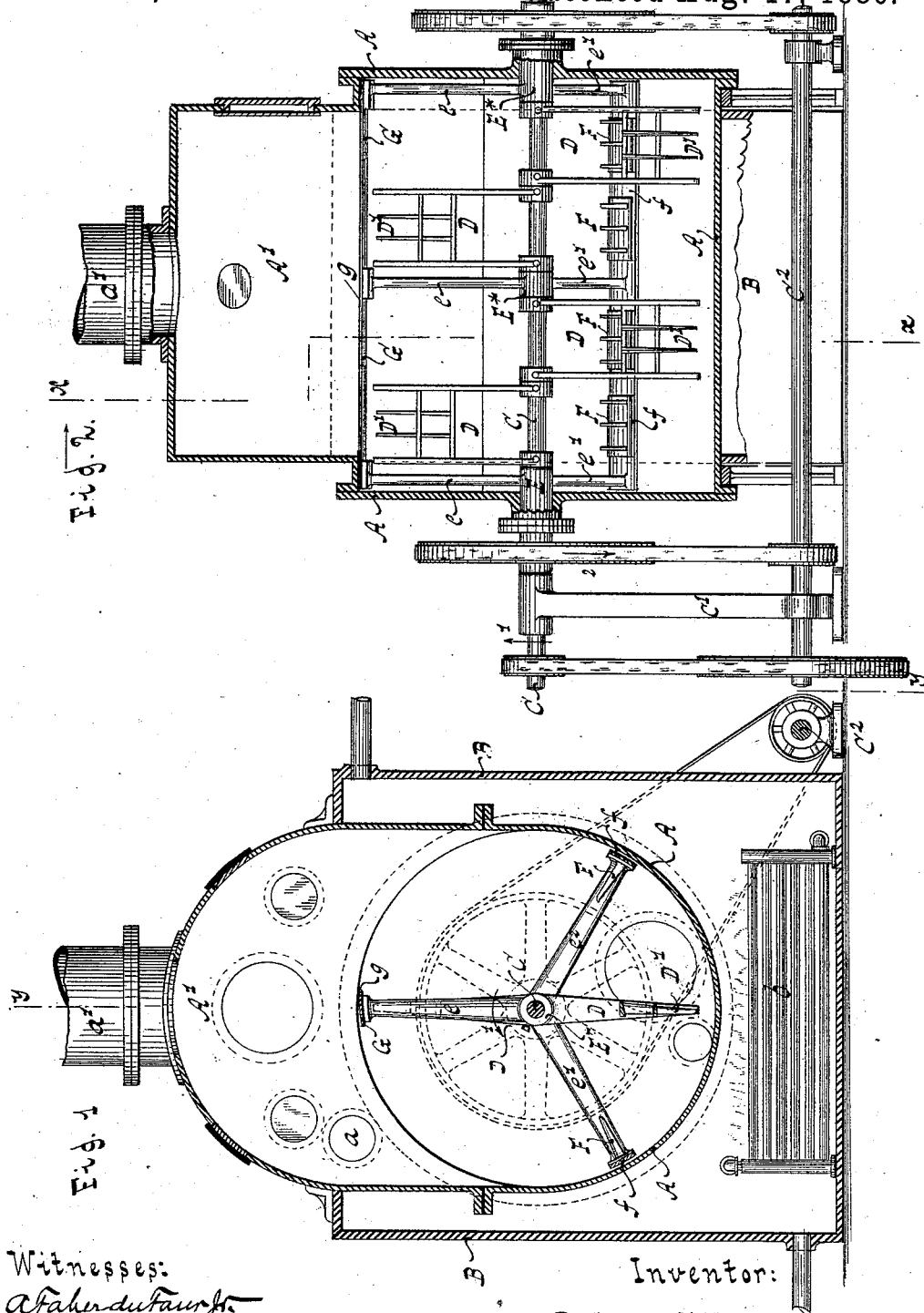


(No Model.)

R. ELLIN.  
VACUUM EVAPORATOR FOR MILK.

No. 347,584.

Patented Aug. 17, 1886.



Witnesses:  
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by *Van Santwood & Hark*  
his Attorneys.

# UNITED STATES PATENT OFFICE.

ROBERT ELLIN, OF YONKERS, NEW YORK.

## VACUUM-EVAPORATOR FOR MILK.

SPECIFICATION forming part of Letters Patent No. 347,584, dated August 17, 1886.

Application filed June 10, 1886. Serial No. 204,755. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT ELLIN, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented new and useful Improvements in Vacuum-Evaporators for Milk, of which the following is a specification.

My invention relates to improvements in evaporators, and especially to those which are designed for treating milk; and it consists, essentially, in the combination, with a stationary container for the fluid to be evaporated, of a series of rotating frames, cutting-blades on said frames, and a series of counter cutting-blades and a scraper, said counter cutting-blades and the scraper revolving in the same direction with the cutting-blades at a lower rate of speed or in an opposite direction, all of which is more fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a transverse section in the plane  $xx$ , Fig. 2, of an evaporator constructed according to my invention. Fig. 2 is a longitudinal section thereof in the plane  $yy$ , Fig. 1.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates a stationary container that is intended to receive the fluid to be evaporated. Instead of making the same cylindrical, as is customary, I provide it with a dome, A', which extends almost through its entire length, and is provided with a feed-opening,  $a$ , and with a number of glass windows, so that the interior of the container may be inspected from without. The object of this dome A' is to obtain a larger space for the accumulation of the distillation, so as to evaporate the liquid more rapidly. The distilled liquid is led from the dome by an exit-pipe,  $a'$ , to which a pump may be connected to create a vacuum. The container is surrounded by a hot-air chamber, B, which contains a series of steam pipes or radiators,  $b$ , and is provided with an inlet and an outlet pipe for the air. The air flowing through the chamber is held at a constant temperature, (below 140° Fahrenheit for milk,) so that the container cannot become overheated.

Instead of an air-chamber, a water-jacket or other well-known means can be used to prevent an excessive temperature.

In the evaporation of milk, to reduce the same to a dry powder, as well as in the evaporation in general, it is very necessary to provide means to keep the mass constantly agitated, and also to free the same from the walls of the container, to prevent charring.

For treating milk I construct the apparatus as follows: Through the center of the container A extends a shaft, C, which is provided with bearings in the same and in a standard, C'. A rotary motion in the direction of arrow 1 is imparted to the shaft by means of a belt-and-pulley connection with a counter-shaft, C', and on it are rigidly secured a series of cutting-blades, D', having their keen edges facing in the direction of rotation of the frame. These series of blades extend throughout the length of the container and revolve at a high rate of speed. Upon the shaft C is loosely fitted a sleeve, E, Fig. 2, which extends into the container and carries a number of radiating arms,  $e e' e''$ , and at proper intervals in the length of the shaft are loosely fitted additional sleeves, E\*, all said sleeves carrying corresponding arms  $e e' e''$ . To the arms  $e e'$  of each sleeve are attached long and narrow plates  $f$ , which extend throughout the length of the container, but do not come into contact with the walls of the same in their revolutions. These plates  $f$  serve as bases for the counter cutting-blades F, which are arranged thereon at the proper intervals to pass between the blades D' on the frames D. On the third arm,  $e''$ , of each sleeve E E\* is secured a long narrow scraper, G, which extends throughout the length of the container, and is provided with a sharp cutting-edge,  $g$ , that is in close contact with the walls of the container. The sleeve E, and consequently the counter cutting-blades and the scraper, are rotated, as shown in the drawings, in the same direction as the shaft, but at a lower rate of speed, and, if desired, the sleeve may be rotated in the opposite direction. In this example the rotation of the sleeve is effected by means of a belt-and-pulley connection with the counter-shaft C'. The sleeve E\* at the right-hand end of the drum can also be connected by pulleys and a belt with the counter-shaft C'. The scraper G removes all the material which settles on the walls of the drum, and as it accumulates on the counter-blades F is broken up

by the action of the cutting-blades D'. By rotating the two sets of blades and the scrapers in an opposite direction or at different rates of speed the contents of the container are kept constantly agitated and are continually removed from the walls as they accumulate thereon and broken up by the blades. My apparatus can be used for evaporating liquid masses of any description, just as efficiently as milk. The residue after evaporation can be removed through suitable openings in the bottom of the container.

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

1. The combination, with the stationary container, of the series of rotating frames D, the cutting-blades D' thereon, the series of counter cutting-blades F, and the scraper G, said blades F and scraper being constructed to rotate independently of the cutting-blades D', substantially as shown and described.

2. The combination, with the stationary container, of the series of revolving cutting-blades D', the series of counter cutting-blades F, and the scraper G, said blades F and scraper G being constructed to revolve inde-

pendently of the cutting-blades D, as shown and described.

3. The combination, with the stationary container A and the rotary shaft extending through the same, of the frame D, secured thereto, the cutting-blades D' thereon, the sleeves B E\*, loosely fitted to the shaft and rotating independently of the shaft, the arms thereof, and the counter cutting-blades F, and the scraper G, attached to said arms, substantially as shown and described.

4. The combination, with the stationary container A, its dome A', and its jacket B, of the series of rotary frames D, the cutting-blades D' thereon, the series of counter cutting-blades F, and the scraper G, said blades F and scraper G to revolve in an opposite direction to the cutting-blades, substantially as shown and described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

ROBERT ELLIN. [L. s.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.