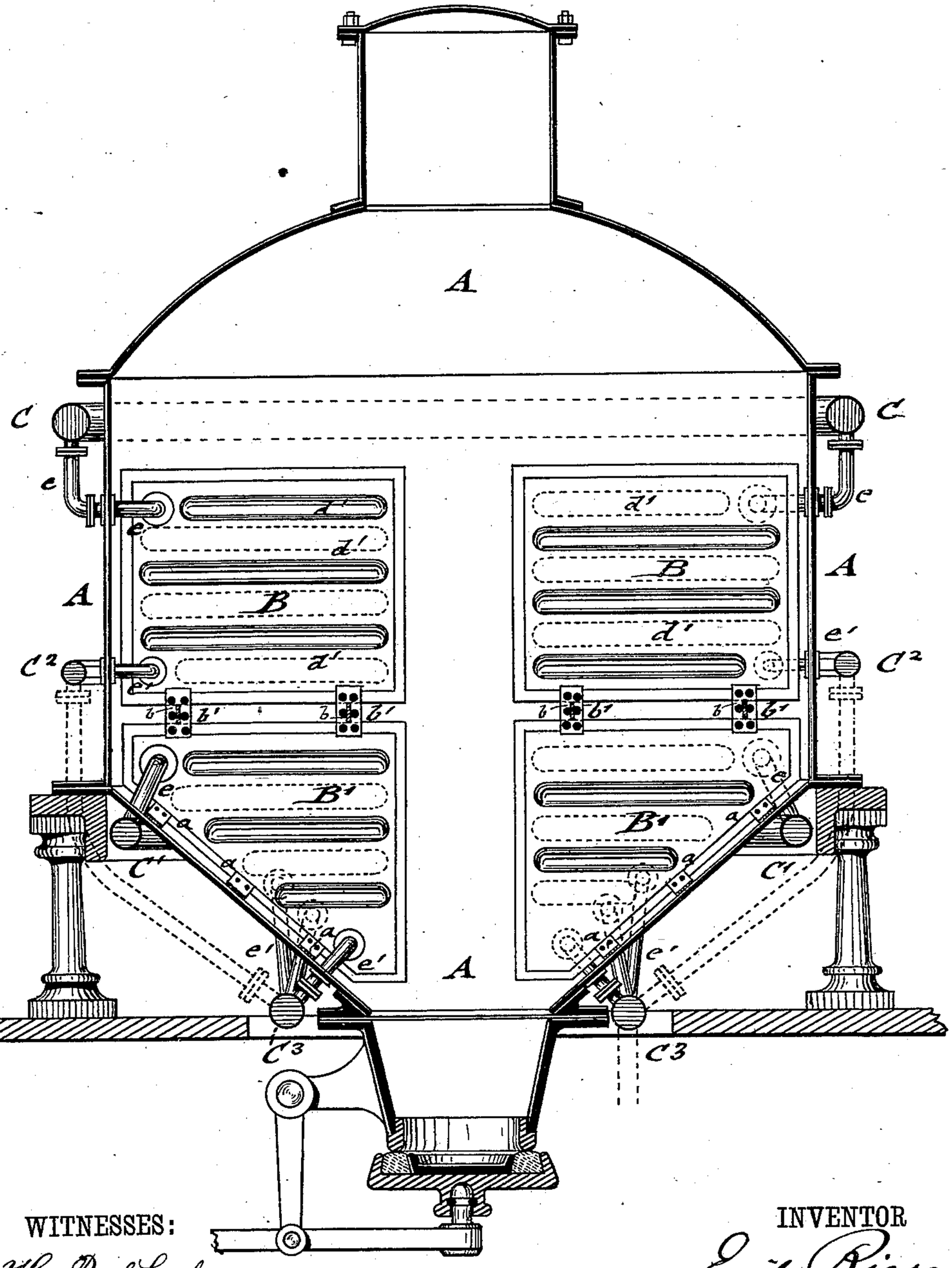
(No Model.) 2 Sheets—Sheet 1.

E. RIESE.

VACUUM PAN.

No. 268,126. Patented Nov. 28, 1882.

Fig. 1



WITNESSES:

H. Rafsbach

Otto Risch

INVENTOR

Emil Riese

BY Paul Goepel.

ATTORNEY

(No Model.)

2 Sheets—Sheet 2.

E. RIESE.

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No. 268,126. Patented Nov. 28, 1882.

Fig. 2.

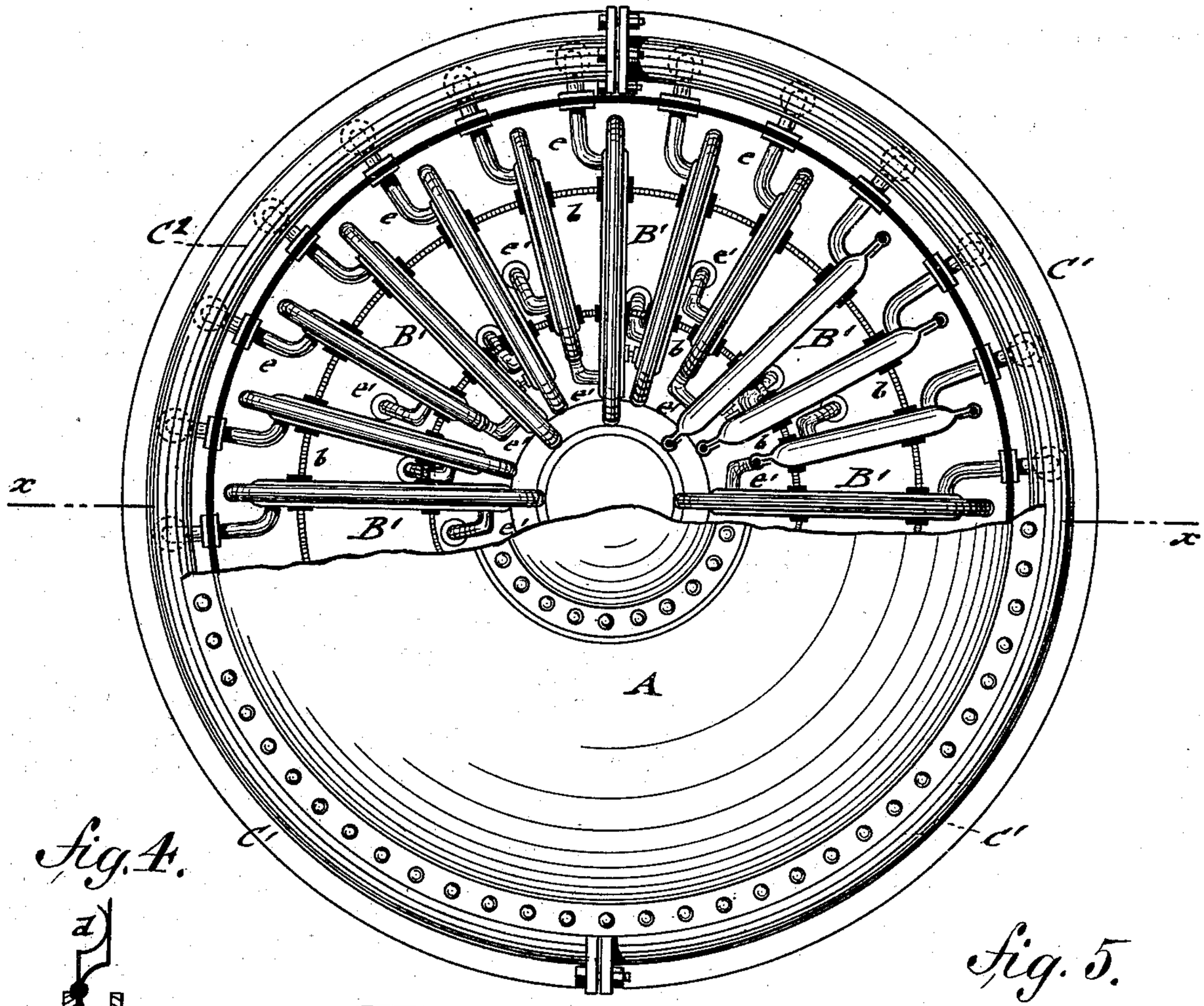


Fig. 4.

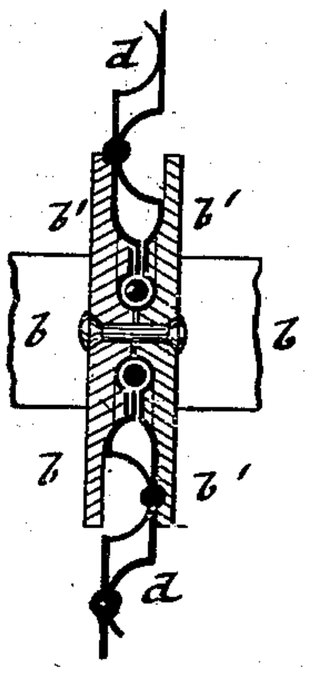


Fig. 3.

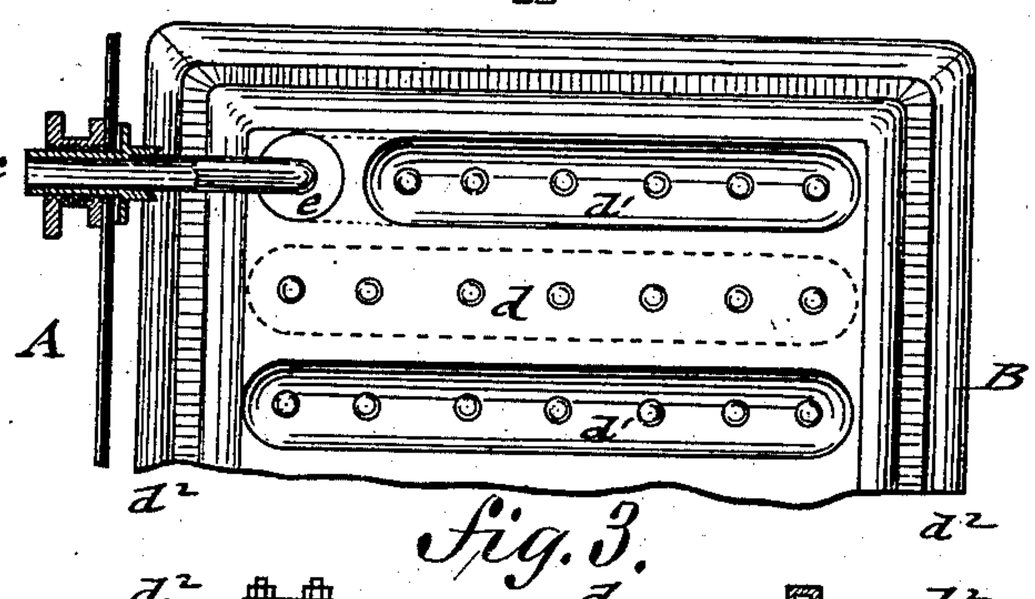


Fig. 5.

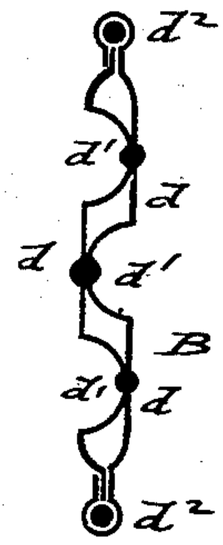
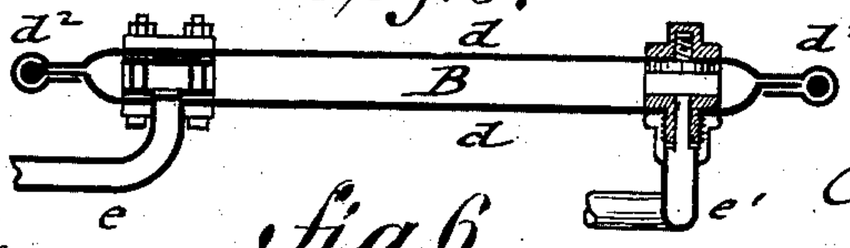


Fig. 6.



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UNITED STATES PATENT OFFICE.

EMIL RIESE, OF JERSEY CITY, NEW JERSEY.

VACUUM-PAN.

SPECIFICATION forming part of Letters Patent No. 268,126, dated November 28, 1882.

Application filed September 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, EMIL RIESE, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Vacuum-Pans, of which the following is a specification.

This invention has reference to improvements in the construction of vacuum-pans, by which saccharine liquor is evaporated in a more effective manner; and the invention consists of a vacuum-pan arranged with an upper and lower tier of radial evaporators of special construction, said evaporators being provided with steam supply and discharge pipes, and constructed of two plates riveted together, and having longitudinal grooves alternating at opposite sides, so as to form a large heating-surface at the interior of the pan.

In the accompanying drawings, Figure 1 represents a vertical central section of my improved vacuum-pan, taken on line *x x*, Fig. 2; Fig. 2, a top view, partly in horizontal section; and Figs. 3, 4, 5, and 6 are details of one of the radial evaporators employed in my vacuum-pan.

Similar letters of reference indicate corresponding parts.

By referring to the drawings, A represents a vacuum-pan, of the usual approved construction, dimensions, and material, which is provided at the interior, in place of the steam-coils heretofore used for boiling the liquor, with a series of vertical evaporators, B B′, that extend radially from an open space in the center of the pan to the circumference of the same. The radial evaporators B B′ are arranged in two separate tiers, an upper tier, B, in the upper cylindrical part of the vacuum-pan, and a lower tier, B′, in the lower conical part of the pan. The lower tier of evaporators, B′, is supported by brackets *a a*, pivoted to the wall of the lower conical part of the pan, and to the lower evaporators, B′, and connected with the upper tier, B, by means of concentric rings *b b* and pivoted side plates, *b′ b′*, whereby both tiers are held in position at the interior of the pan, as shown in Figs. 1 and 4. The evaporators B of the upper tier are made of oblong shape, while the evaporators B′ of the lower tier are made of triangular shape. The evaporators B B′ of both tiers are constructed of two copper plates, *d d*, which are provided with horizontal semicircular grooves or depressions *d′ d′* alternately at opposite sides, said grooves extending longitudinally throughout the full length of the evaporators. The alternately-grooved plates *d d* are riveted together at the lines of contact of the grooves *d′ d′* of one plate with the intermediate flat portions of the other plate. Each evaporator B B′ is stiffened at its circumference by a stiffening-rod, d^2, around which one of the plates *d*, composing the evaporator, is lapped and hermetically soldered, as shown in Figs. 5 and 6.

The steam is supplied to the upper and lower tiers of evaporators, B B′, by steam-supply pipes C C′, which encircle the vacuum-pan A. The steam-pipes C C′ are connected by short branch pipes *e e*, of less diameter, with the upper corners of the evaporators, the pipes *e e* extending through the side wall of the vacuum-pan, and being securely packed thereto to prevent leakage. The inner ends of the branch pipes *e e* are bolted to the walls of the evaporators, at their points of connection therewith, so as to prevent any escape of steam into the pan.

To the lower part of both tiers of evaporators B B′ are applied, in the same manner as the supply-pipes *e e*, discharge-pipes *e′ e′* for the steam and the water of condensation collecting at the lower parts of the evaporators. The pipes *e′ e′* are also tightly packed to the wall of the vacuum-pan, at the points where they pass through the same to the outside. The pipes *e* of the upper tier of evaporators, B, are connected to an exterior encircling pipe C. The collecting-pipe C^2 of the tier of evaporators B is connected to the pipe C^3 of the lower evaporators, so as to conduct the steam and water of condensation to the lower pipe, C^3, from whence they are conducted off in any suitable manner.

The evaporators B of the upper tier are made of equal length, while the evaporators B′ of the lower tier are made of variable length, so as to allow the arrangement of an equal number of evaporators in the lower as in the upper tier. For this purpose every third evaporator of the lower tier is made equal in width to the evaporators of the upper tier, while the two intermediate evaporators of the lower tier are made norrower, as shown clearly in Fig. 2. The remaining accessories—such as condenser, gages, windows, proof-

stick, &c.—are the same as in the vacuum-pans heretofore in use, and are therefore not shown in the drawings.

In boiling the saccharine liquor in my improved pan it is filled up to a level with the upper evaporators, into which steam is first admitted. As the liquor is raised to boiling-heat and gradually evaporated the level of the same falls until it arrives at the lower part of the upper evaporators. Steam is now admitted to the lower tier of evaporators, by the large heating-surface of which the effective condensation of the liquor is continued until the charge is ready to be drawn off. As the evaporators of both tiers are supported vertically, the liquor recedes gradually between the evaporators as it becomes gradually more and more concentrated, the grooves shedding the liquor without retaining any part of the same so as to burn the same, which forms one of the objections to the pans having an interior steam-coil of gradually-decreasing diameter.

The evaporators described can be manufactured at less expense than the steam-coils, and have the advantage that any one can be readily removed for repairs, in case of leakage, and be replaced without requiring the removal of the entire coil, as heretofore. As the evaporators do not extend fully to the center of the pan, an open cylindrical space is formed at the central part of the pan, whereby a continuous circulation of the liquor at the center is kept up toward the circumference and back again, so that the evaporation is accelerated and accomplished in less time and a more effective manner than heretofore.

Having thus described my invention, I claim as newand desire to secure by Letters Patent—

1. A vacuum-pan having an upper tier of radial evaporators provided with steam supply and discharge pipes, and a lower tier of radial evaporators, vertically below the upper tier, and provided with separate steam supply and discharge pipes, substantially as set forth.

2. A vacuum-pan provided with an upper tier of radial evaporators of oblong shape, extending from the circumference to some distance from the center of the pan, and with a lower tier of evaporators, of triangular shape, vertically below the upper tier, the lower tier of evaporators being made of varying width, so that the same number of evaporators can be arranged at the lower conical part as in the upper part of the pan, substantially as specified.

3. In a vacuum-pan, an evaporator composed of two plates having longitudinal grooves alternating at opposite sides, said plates being riveted together at the lines of contact of the grooves of one plate with the intermediate flat portions of the other plate, and secured to a stiffening exterior rod or frame, substantially as set forth.

4. The combination of a vacuum pan, an upper tier of evaporators, a lower tier of evaporators, both tiers extending from the circumference toward a central open space of the pan, separate steam supply and discharge pipes for each tier of evaporators, and means whereby both tiers of evaporators are rigidly connected with each other and to the pan, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EMIL RIESE.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.