H. KOHLY, Jr.

Evaporator and Cooler.

No. 53,226. Patented March 13, 1866.

Fig. 1,

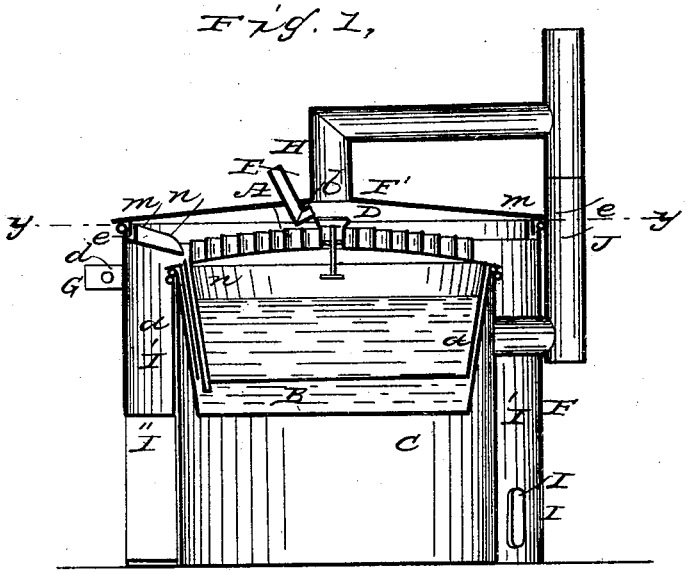
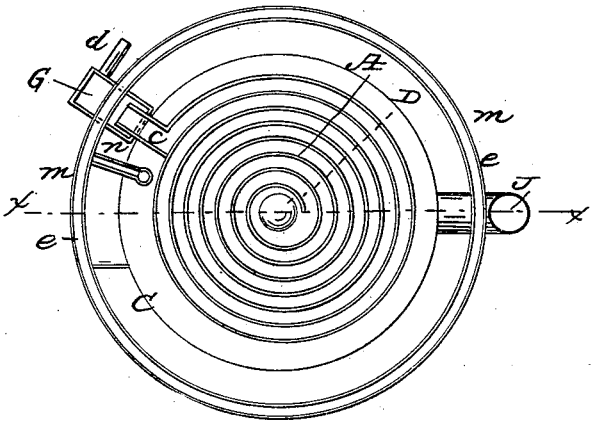


Fig. 2,



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY KÖHLY, JR., OF POTOSI, MISSOURI, ASSIGNOR TO HIMSELF AND J. CURTIS, OF SAME PLACE.

IMPROVED EVAPORATOR AND COOLER.

Specification forming part of Letters Patent No. **53,226**, dated March 13, 1866.

To all whom it may concern:

Be it known that I, HENRY KÖHLY, Jr., of Potosi, in the county of Washington and State of Missouri, have invented a new and Improved Evaporator and Cooler; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a vertical central section of this invention, the line *x x*, Fig. 2, indicating the plane of section. Fig. 2 is a horizontal section of the same, taken in the plane indicated by the line *y y*, Fig. 1.

Similar letters of reference indicate like parts.

This invention refers to an improvement in that class of evaporators in which the juice or liquid to be evaporated passes through a descending volute channel, by which the same is spread in a thin sheet over a large evaporating-surface.

The invention consists in placing the volute channel over a boiler and furnace surrounded by an air-jacket in such a manner that the air which enters the air-jacket, in passing upon the heated sides of the furnace and over the surface of the liquid to be evaporated, creates a partial vacuum and carries off the moisture or vapors rising from said liquid. Said volute channel is placed on a boiler containing water and exposed to the heat of a fire in a furnace. The steam formed in said boiler heats the volute channel and escapes through a suitable escape-pipe, which leads into a pipe connecting with the flue which carries off the products of combustion evolved from the fire in the furnace. The escaping steam increases the draft in the flue, and by this draft the evaporation of the liquid in the volute channel is facilitated.

A represents a volute channel, made of copper, galvanized iron, or other suitable material, with more or less slope, according to the nature of the liquid to be evaporated. This channel is provided with a rim or flange, *a*, projecting from its bottom surface, and it is made to fit into a boiler, B, that is placed on the furnace C. The boiler is partially filled with water, as indicated in Fig. 1 of the drawings, and the steam rising from said water heats the volute channel and escapes through a pipe, D. This pipe is situated in the center, and is closed by a safety-valve which opens as soon as the pressure of the steam exceeds a certain point. The danger of overheating the liquid in the volute channel is thereby avoided. This liquid is fed into said channel through a pipe, E, which is or may be provided with a bell-shaped mouth or funnel, for the purpose of facilitating the operation of introducing the liquid. Said pipe passes down through the top F′ of the casing F, and it is siphon-shaped, or provided with a trap, *b*, at its inner end, to prevent the entrance of the external cold air.

The liquid or juice, after having been boiled down or evaporated to the desired point, runs out of the volute channel through a spout, *c*, into a trap-box, G, inserted into the side of the casing F, and thence through a pipe, *d*, into a suitable receptacle. The object of the trap-box is to prevent the entrance of external air. The casing F, which incloses the furnace, the boiler, and the evaporator, is made of metal, or other suitable material, and provided with a movable top, F′, which is fitted to it by a liquid joint, *e*, to prevent the entrance of external air.

The products of combustion escaping from the furnace pass off through the flue J, and a pipe, H, rising from the center of the top F′, leads to the flue, as shown in Fig. 1. Access is had to the furnace by a fire-door, I″, which passes through the casing and between the furnace and casing in an annular space, I′, to which access is had through apertures I near the bottom of the casing. The air which passes in through these apertures, on coming in contact with the sides of the furnace, which ought to be made of metal or other good conductor of heat, becomes rarefied and rushes up above the volute channel A, where it absorbs the vapors arising from the liquid to be evaporated, and then passes off through the hot-air flue H into the smoke-flue J, as previously stated.

The draft through the air-tube H is still further increased by the action of the steam escaping from the boiler through the pipe D, and a partial vacuum is thereby formed over the surface of the liquid to be evaporated, whereby the evaporation is much facilitated.

The liquid joint *e* is constructed of a double rim or channel, *m*, on the inner edge of the casing, and a rim on the top fitting into said channel, which is filled with water. This water is continually renewed by the water resulting from the condensation underneath the cover F′ and inside of the hot-air flue, and the liquid joint requires no further attention after the apparatus has been once set in operation. The surplus water arising from the condensation, which is liable to overflow the sides of the channel *m*, is conducted by a small pipe, *n*, passing through the side of the volute channel, down into the bottom of the boiler. By making this pipe to extend below the surface of the water in the boiler the escape of steam through the same is prevented, and, furthermore, the boiler is made partially or wholly self-feeding.

With an apparatus of this kind the operation of skimming can in most cases be dispensed with; but if it should be desirable not to dispense with the same I apply a series of skimmers rotating on a horizontal or inclined axle, or several axles extending over and parallel to the plane of the volute channel and propelled by the action of the steam or hot air in the flue H, or by any other suitable means.

It is obvious that this apparatus can also be used with advantage as a cooler.

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

1. The air-space I′, formed between the jacket F and boiler C, in combination with the boiler D, volute channel A, and flues H J, constructed and operating substantially as and for the purpose described.

2. Making the boiler B partially or wholly self-supplying by carrying into it the condensed water resulting from the steam over the volute channel, substantially as and for the purpose set forth.

HENRY KÖHLY, JR.

Witnesses:
JOSEPH CONNOLLY,
JAMES CURTIS.