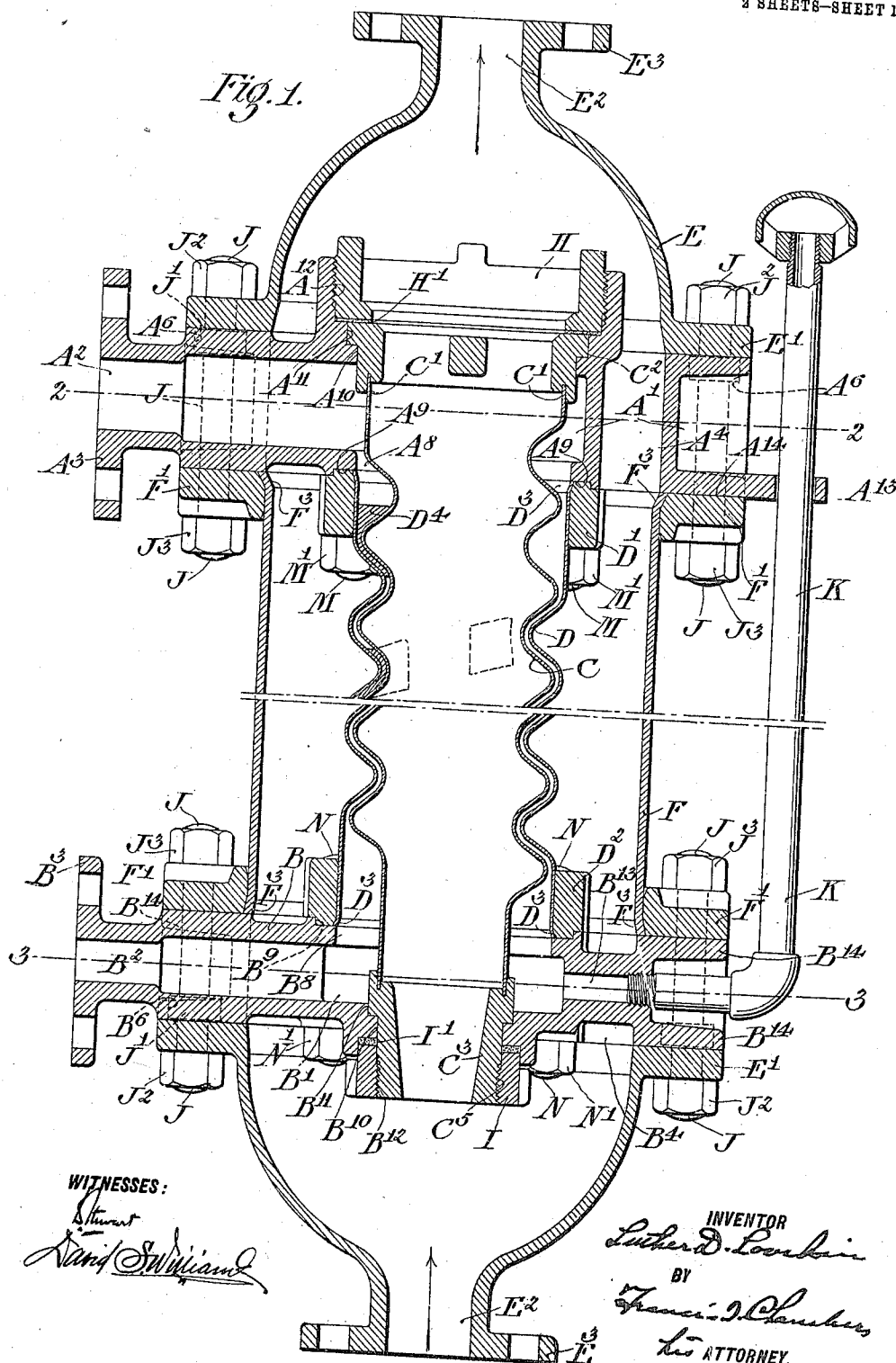


983,915.

L. D. LOVEKIN.  
VAPOR CONDENSER.  
APPLICATION FILED MAY 1, 1909.

Patented Feb. 14, 1911.  
3 SHEETS-SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2

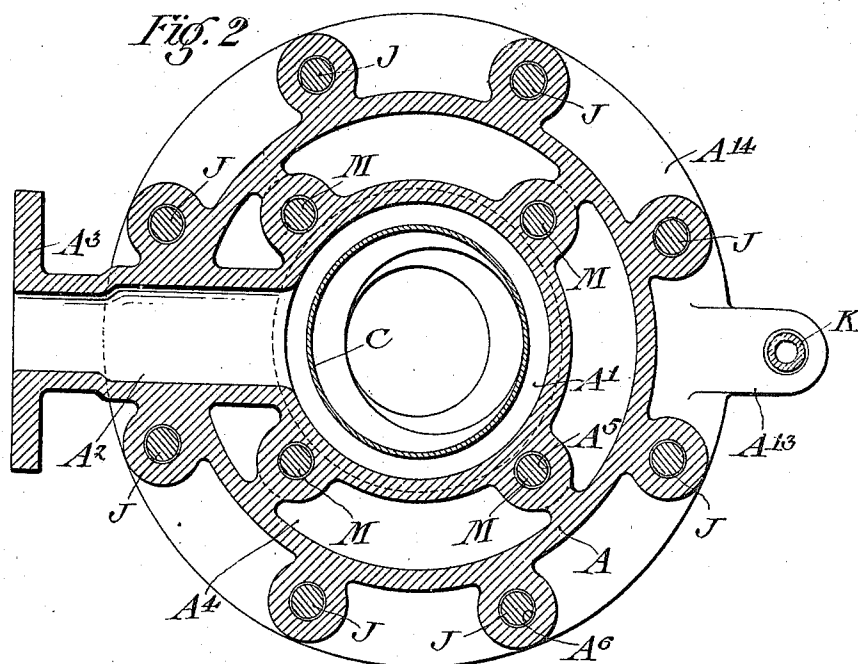
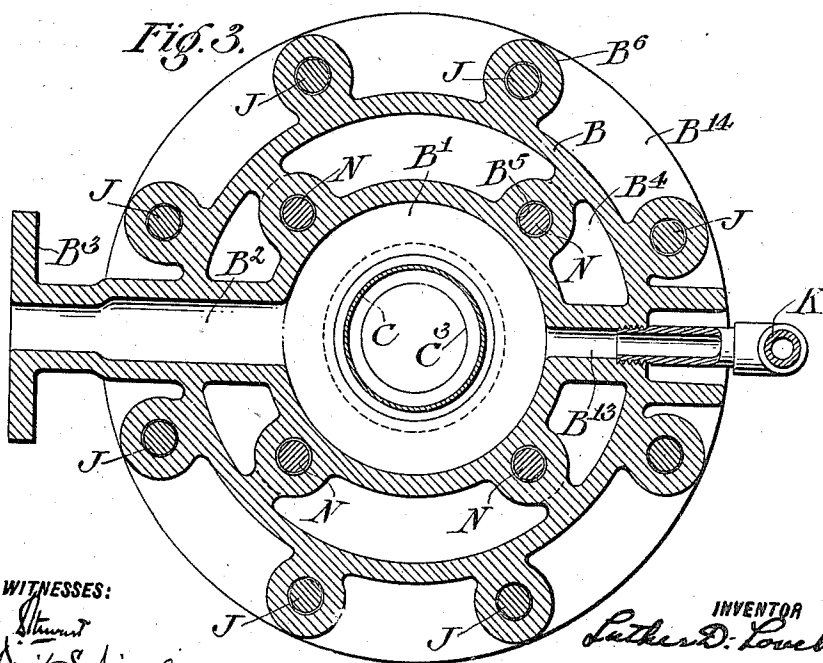


Fig. 3.



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*Francis C. Chambers*  
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# UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

VAPOR-CONDENSER.

983,915.

Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed May 1, 1909. Serial No. 493,279.

*To all whom it may concern:*

Be it known that I, LUTHER D. LOVEKIN, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Vapor-Condensers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

The present invention relates to apparatus of the kind in which two fluids are caused to flow in proximity to each other in order that one may derive heat from, or cool the other, and particularly to apparatus in which water is caused to flow along the surface of a container for steam in order to withdraw heat from the steam in the operation of purifying water by distillation.

The object of the present invention is to provide apparatus, of the kind and for the purpose specified, which is efficient and durable in operation and is characterized by its mechanical simplicity and compactness and the ease with which it may be assembled and taken apart and reassembled when desired for inspection, cleaning or repair purposes.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention and its specific objects and advantages, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated one of the forms in which the invention may be embodied.

Of the drawings, Figure 1 is a sectional elevation of the complete device showing the construction in accordance with my invention. Fig. 2 is a sectional view on the line 2—2 of Fig. 1. Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

In the drawings, in the particular form of the invention shown in the drawings, the device is designed for use as a condenser in the purification of water by distillation, and comprises a casing which is formed of a cylindrical body portion F, disk like end members A and B connected to the ends of the body member F, and cup shaped end members E which are secured, one against the upper side of the end member A and the other against the under side of the end member B. The cup shaped members E are each provided at their apices with a port E<sup>2</sup> and

a flange E<sup>3</sup> for a pipe connection, and in operation the cooling water enters the casing through the port E<sup>2</sup> at the bottom of the device and flows out of the port E<sup>2</sup> at the top of the device. As shown, the members A and B are provided with flanges A<sup>14</sup> and B<sup>14</sup>, respectively, at their opposite ends. The members E are each provided with a flange E' which bears against the adjacent flange A<sup>14</sup> or B<sup>14</sup> and the member F has flanged portions E' and F' at its ends which bear against the adjacent flanges A<sup>14</sup> and B<sup>14</sup>. Each of the members A and B and the adjacent flanges E' and F' are secured together by clamping bolts J and the corresponding nuts J<sup>2</sup> and J<sup>3</sup>. As shown, each bolt J is provided with a collar or enlargement J'. The members A and B are formed at their sides adjacent the corresponding end members E with sockets A<sup>6</sup> and B<sup>6</sup> receiving the collars J'.

In the form illustrated, the casing body F has its ends F<sup>3</sup> expanded to hold the collar like flanged portions F' against removal from the casing body. The two flanges A<sup>14</sup> of the member A are connected by hollow bosses A<sup>5</sup> which surround the bolts J and similar bosses B<sup>5</sup> are provided between the flanges B<sup>14</sup> of the member B.

The member A is formed with an inlet port A<sup>2</sup>, for the steam to be condensed, leading to the chamber A' formed in the portion of the member A within the inclosed casing. A flange A<sup>3</sup> is provided for a pipe connection to the inlet port A<sup>2</sup>. Openings A<sup>8</sup> and A<sup>10</sup>, leading from the chamber A', are formed in the top and bottom walls of the member A. These openings are preferably, as shown, coaxial with the casing body F. An annular seat A<sup>9</sup> surrounding the opening A<sup>8</sup> is formed on the underside of the member A and the end portion D' of the tube D is clamped against the seat A<sup>9</sup> by means of bolts M passing through the portion D' and tapped into the sockets A<sup>5</sup> formed in the member A, nuts M' being threaded onto the lower ends of the bolts. The end portion C' of the tube C, which is surrounded by the tube D, passes through and substantially fills the opening A<sup>10</sup> in the wall of the member A. The end portion C' is provided at its upper end with a circumferential shoulder C<sup>2</sup> which is received in the enlargement A<sup>11</sup> of the opening A<sup>10</sup>, and the end portion C' is clamped in place in the socket A<sup>11</sup> by means of a

hollow nut H which is threaded into an internally threaded hollow boss A<sup>12</sup> which surrounds the socket A<sup>11</sup> and is of greater diameter than the socket A<sup>11</sup>. The packing washer H' extends between the lower end of the nut H and the upper end of the member C' and the wall of the surrounding socket A<sup>11</sup>.

The tubes C and D, which are preferably formed of thin metal, are connected to the end portions C' and D' in any desirable manner. In the form shown, the outer end of the tube D is expanded at D<sup>3</sup> to hold the end portion D' against removal. Each of the tubes C and D may be brazed to the end portions C' and D' respectively.

The member B is provided with an outlet port B<sup>2</sup>, for the condensed water, similar in shape and location to the inlet port A<sup>2</sup> of the member A, and the member B has parts B', B<sup>3</sup>, B<sup>4</sup>, B<sup>5</sup>, B<sup>6</sup>, B<sup>8</sup>, B<sup>9</sup>, and B<sup>10</sup> respectively similar to the parts A' A<sup>3</sup>, A<sup>4</sup>, A<sup>5</sup>, A<sup>6</sup>, A<sup>8</sup>, A<sup>9</sup> and A<sup>10</sup> of the member A.

The tube D is provided with an end portion D<sup>2</sup>, similar to the end portion D', which is clamped against the seat B<sup>9</sup> by bolts which are tapped at their upper ends into the end portion D<sup>2</sup>, pass through the sockets B<sup>5</sup>, and have clamping nuts N' at their lower ends which bear against the underside of the member B.

The tube C has a lower end portion C<sup>3</sup> which passes through the opening B<sup>10</sup> and has at its upper end an enlargement which enters and seats against the bottom of a socket or enlargement B<sup>11</sup> of the opening B<sup>10</sup>. The lower end of the end portion C<sup>3</sup> is externally threaded at C<sup>5</sup> and the end portion C<sup>3</sup> is clamped in place in the member B by a nut I engaging the threaded portion C<sup>5</sup> and lower end portion C<sup>3</sup> and entering a socket B<sup>12</sup> formed on the under side of the member B and surrounding the opening B<sup>10</sup>. In this socket and above the upper end of the nut I is brazed a packing ring I'.

The member B is formed with a second lateral port B<sup>13</sup> which leads from the chamber B' to the interior of the casing and has connected to its outer end a vacuum breaking device in the form of an elongated vertical tube K open to the atmosphere at its upper end. The tube K passes through an apertured ear A<sup>13</sup> carried by the member A. Lugs D<sup>4</sup> may be brazed or otherwise secured to the tube D in order to space the tube C with reference to tube D and one of these lugs at least is preferably arranged at the upper end of the tube D as shown so that when the tube C is screwed into and out of place its outer surface will be cleaned by the lug. No claim to the cleaning lug is made herein, however, as this feature of construction is described in my other application Serial No. 493,277 filed of even date herewith.

In operation, the steam to be condensed enters the chamber A' in the member A through the lateral port A<sup>2</sup> and passes from the chamber A' to the chamber B' of the member B, through the space between the tubes D and C. From the chamber B', the steam, or rather the water formed by its condensation, passes out of the apparatus through the port B<sup>2</sup>. As the end members C<sup>2</sup> and C<sup>3</sup> of the tube C are hollow, and ports or passages A<sup>4</sup> pass through the members A and B at the margins of the chambers A' and B', respectively, the cooling water can flow freely along the inner surface of the tube C and the outer surface of the tube D, thus insuring a very effective and rapid transfer of heat from the steam, in the space between the tubes D and C, to the water flowing along the exposed surfaces of the tubes.

As shown, the tubes D and C are spirally corrugated and threaded together as in the construction described and claimed in my prior Patent No. 904,627, granted Nov. 24, 1908, thus permitting the steam container formed by the tubes A and B to have a very large surface area in comparison with its volume, and at the same time permitting unequal expansion of the tubes D and C both with respect to each other and to the casing body F to occur without putting undue strain on any portion of the apparatus which would injure the apparatus and, in particular, tend to cause leaky joints in any of the apparatus. It will be observed that the external diameter of the lower end of the tube C, including the end portion C<sup>3</sup>, is less than the minimum internal diameter of the corrugated tube D, while the diameter of the opening A<sup>10</sup> is greater than the external diameter of the corrugated tube C, so that by loosening nuts J and H the tube C may be withdrawn from the tube D by threading it out of place and may be replaced in a similar manner, but I make no claim to these features of construction, as they are claimed in my copending application, Serial No. 463,962, filed Nov. 23, 1908.

The construction disclosed is obviously efficient and durable in operation and compact in form. The simplicity and ease with which it may be assembled and taken apart and reassembled are apparent and in this connection I call attention to the fact that when it is desired to remove the tube C it is only necessary to remove the end portions E of the casing and nuts H and I in order to disconnect and remove the tube, and that, consequently, the tube C may be withdrawn when necessary without disturbing the pipe connections to the steam inlet port A<sup>2</sup> or the water condensation outlet port B<sup>2</sup>. To remove the end member E it is only necessary to remove the nuts J<sup>2</sup>. Furthermore, when it is desired to remove one of the

members A or B, for instance B, it is only necessary to remove the nuts J<sup>3</sup> and also the nuts N', and of course the nut I. After the member B is removed the tube D can be removed by removing the nuts M'. In consequence of this the end member A and the casing member F need not necessarily be separable, though I prefer the construction of the casing which is illustrated.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a device of the kind specified, a structure in the form of a casing having chambered spider-like portions extending into the casing, with the chamber in each of said chambered portions opening at opposite sides thereof within the casing, and each of said portions being provided also with a port leading from the interior of the portion and opening externally of the casing, a tubular member having its ends closing the openings in the adjacent sides of said portions, and a second tubular member passing through the first mentioned tubular member and so proportioned as to leave a passage between it and the first mentioned tubular member, said second member being connected with said portions in such man-

ner as to close the openings in the remote sides of said portions.

2. In a device of the kind specified, a casing comprising a body member open at its ends, a pair of end members, a pair of spider like intermediate members, arranged one between each end member and the corresponding end of the body member, each intermediate member being formed with a chamber, opening within the casing, at opposite sides of the member, and being provided also with a port leading from said chamber and opening externally of the casing, a tubular member connected at its ends with the intermediate members and filling the openings in the adjacent sides thereof, and a second tubular member passing through the first mentioned tubular member and so proportioned as to leave a passage between it and the first mentioned tubular member, said second member being connected with said intermediate members in such manner as to close the openings in the outer ends of said intermediate members.

LUTHER D. LOVEKIN.

Witnesses:

ARNOLD KATZ,  
D. STEWART.