No. 676,485. Patented June 18, 1901.

C. P. ALTMANN.

WATER TUBE BOILER.

(Application filed Aug. 21, 1900.)

(No Model.)

Fig. 1

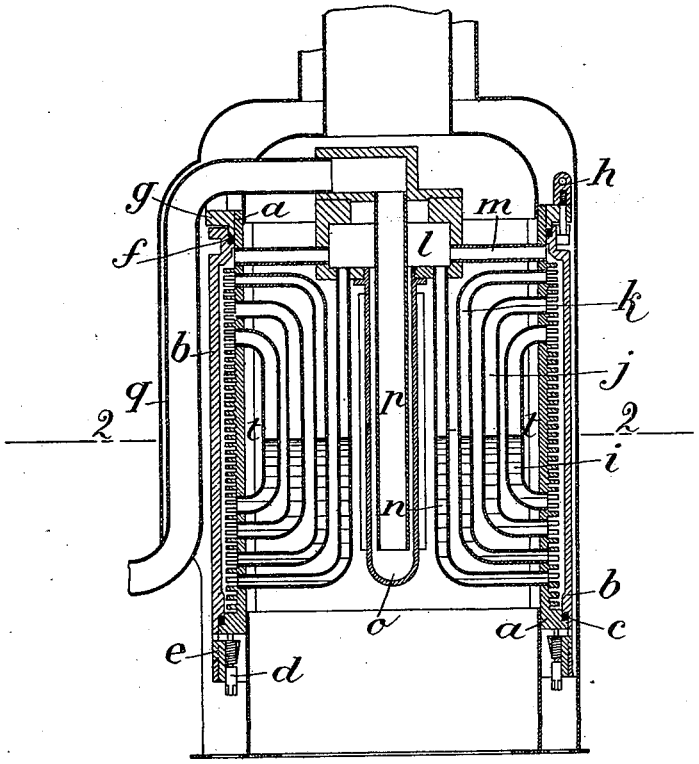
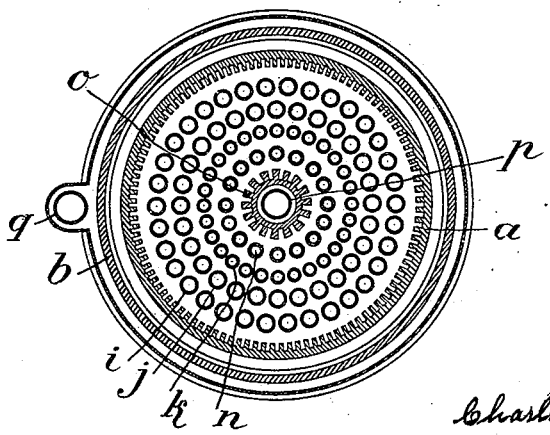


Fig. 2



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES PHILIPPE ALTMANN, OF LYON VAISE, FRANCE.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 676,485, dated June 18, 1901.

Application filed August 21, 1900. Serial No. 27,601. (No model.)

To all whom it may concern:

Be it known that I, CHARLES PHILIPPE ALTMANN, engineer, a citizen of France, residing at 10 Rue des Tuileries, Lyon Vaise, France, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

The present invention relates to steam-generators with water-tubes for producing rapid vaporization characterized by a large heating-surface but of moderate size and by a special manner of arranging the principal parts which considerably facilitates the dismounting of the boiler and the cleaning of all the elements without employing for this purpose special labor or instruments.

In the annexed drawings, Figure 1 is a sectional elevation of the generator, and Fig. 2 a horizontal section of Fig. 1 on the line 2 2.

The generator comprises two cylindrical concentric jackets *a b*, inserted one within the other in such a manner as to leave between them to almost the total extent of their height a certain amount of space and joined one to the other at their ends. A special kind of joint, to which the fluid under pressure (water or steam) has little or no access, insures tightness at each end. For this purpose the lower end of the jacket *a* is provided with a circular rim entering into a corresponding recess in the jacket *b*. Between the flat surfaces of the said two parts a ring *c* of suitable material is placed. At convenient distances from each other screws *d* are placed, which engage screw-nuts *e*, partially lodged in recesses in the jacket *b*. The ends of the said screws *d* bear against the lower edge of the jacket *a*, so that the tightening of the said screws effects that of the joint *c*, and consequently insures the tightness of the jackets *a* and *b* at the lower ends.

At the upper part the jacket *b* is provided with a circular recess, in the bottom of which a ring, consisting of suitable material and encircling the jacket *a*, is placed and is compressed by a ring *g*, similar to those used in the packing of cylinders and the like. This ring is held by blind screw-nuts *h*, the bolts of which have T-shaped heads lodged in a groove in the jacket *b*. These screw-nuts *h* are provided with a hole which allows of them being easily tightened by means of a pin or spike. It will thus easily be understood that at their upper ends the jackets *a* and *b* can dilate freely without that fact affecting the tightness of the joint, as the jacket *a* can slide freely on the inner side of the jacket *b* and the packing-ring *g*, and vice versa.

The interior jacket *a* serves as a cylindrical tube-plate to several concentric series of tubes *i j k*, bent in U shape, making communication between the lower and upper parts of the annular space between the jackets *a* and *b*. Each of these tubes, the number of which can vary according to the dimensions of the apparatus, has its points of junction with the mantle *a* on the same generating-line of the latter. A collector *l*, placed in the center of the upper part of the generator, is connected with the annular space between the jackets *a* and *b* by a series of horizontal or slightly-inclined radiating tubes *m* and is also connected with the lower part of the said annular space by a series of rectangularly-bent tubes *n*, as shown in Fig. 1. From the bottom of the collector *l* a tube *o*, closed at its lower end, descends toward the bottom of the generator. The steam-pipe *p* starts from the bottom of the said pipe *o* and ends at the upper part of the collector *l*, which communicates with the motor by means of a suitably-arranged pipe *q*. The entire outer surface of the inner jacket *a* is provided with deep grooves and its inner surface with rectilineal grooves corresponding to the generating-lines. The raised parts left between the said grooves considerably increase the contact-surface between the heated metal and the water or steam and between the metal and the heated gases, and consequently increases the capacity of the generator.

The action of the generator is as follows: By means of a pump or any other device the water-level is kept constantly at a certain height *t t*, which can be regulated by a suitable float. The said level can, however, be regulated at will for the purpose of proportioning the degree of superheating of the steam to the output of the generator, the level rising when the output is feeble and sinking when the output increases. The different levels can be obtained automatically or by hand. The heat from the furnace in the lower part of the generator underneath the group of

tubes evaporizes the water contained in the tubes and in the annular space between the jackets *a* and *b* and also heats the tube *o*, the useful surface area of which can with advantage be increased by means of ribs, as shown in the drawings. At first the steam rapidly absorbs in rising the heat necessary to superheat it. The superheating can be suitably regulated by varying the water-level in the generator, as above mentioned. The superheating is rendered complete by the passage of the steam in the collector *l* and the tube *o*, from whence it is conducted by the pipes *p* and *q* to the motor which it is intended to feed.

Owing to their curved shape all the tubes in this generator can dilate freely, like the jackets *a* and *b*, and all the elements thus submit without hindrance to the action of the heat, which circumstance guarantees the durability of the joints, an essential condition for good working, especially in boilers for the rapid generation of steam such as the one described.

I declare that what I claim is—

1. A steam-boiler comprising walls having longitudinal ribs upon the surfaces which are in contact with the flames of the furnace, and having transverse ribs upon the surfaces which are in contact with the water or the steam, substantially as described above.

2. A steam-boiler comprising a cylindrical jacket *a* provided on its surface where it comes in contact with the flames of the furnace with longitudinal ribs, and being provided with circular ribs where its surface comes in contact with the water or steam, and a smooth jacket *b* of a greater diameter and surrounding aforesaid jacket *a*, whereby an annular space is produced between said jackets, substantially as described above.

3. A steam-boiler comprising two jackets *a* and *b* of different diameters, of which one surrounds the other whereby an annular space is produced between the same, the inner jacket *a* being provided on the portions of its surface which are in contact with the flames of the furnace with longitudinal ribs and on the portions of its surface which are in contact with the water and the steam with circular ribs and having upon its lower portion a circular projection in the form of a flange forced against an interior cheek of the exterior jacket through the interposition of a joint *c* by means of screws *d* operating in pieces *e* fixedly secured to the lower extremity of the exterior jacket *b*, while the upper portion of the inner jacket *a* is smooth and joined to the exterior jacket *b* by means of the stuffing-box gland *g* and *f*, substantially as described above.

4. A steam-boiler comprising an exterior smooth jacket *b*, an interior jacket *a* having very thin walls provided on its surface where it is in contact with the flames of the furnace with longitudinal ribs and on the portions of its surface which are in contact with the water or steam with circular ribs, U-shaped tubes *i* inserted in the interior jacket *a* and communicating with the annular space between said jacket *a* and the exterior jacket *b*, a steam-collector *l* connected with the upper portion of said annular space by means of radial tubes *m*, a tube *o* provided exteriorly with longitudinal ribs closed at its lower end and communicating with said collector *l*, a tube *p* extending to the bottom of said ribbed tube *o*, passing through said collector *l* and communicating directly with the pipe *q* into which the steam passes, substantially as set forth above.

In witness whereof I have signed this specification in the presence of two witnesses.

CHARLES PHILIPPE ALTMANN.

Witnesses:
THOS. N. BROWNE,
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