R. P. THOMPSON.

CAPS FOR WATER TUBES.

No. 190,526. Patented May 8, 1877.

Fig. 1

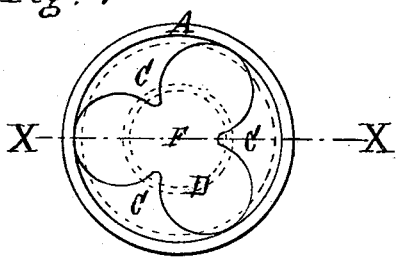


Fig. 3.

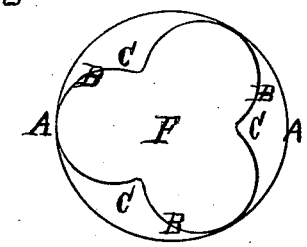
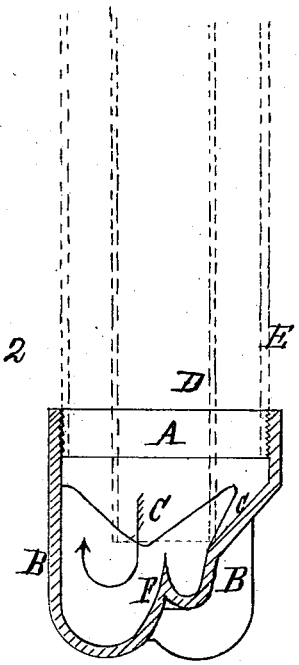


Fig. 2



Witnesses,

Frank L. Thompson

J. Daniel Eby

Inventor.

Robert P. Thompson.

UNITED STATES PATENT OFFICE.

ROBERT P. THOMPSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO EDWARD H. GRAHAM.

IMPROVEMENT IN CAPS FOR WATER-TUBES.

Specification forming part of Letters Patent No. **190,526**, dated May 8, 1877; application filed April 6, 1877.

To all whom it may concern:

Be it known that I, ROBERT P. THOMPSON, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful improvements in caps for closing the lower ends of tubes in sectional boilers; and I do hereby declare the following to be a full, clear, and exact description thereof, such as will enable any one skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan of my improved cap. Fig. 2 is a vertical sectional elevation on line X X; and Fig. 3 is an inverted plan.

My invention relates to the caps used in that form of sectional steam-boilers constructed of a number of tubes depending into a fire-box or furnace from the bottom of a strong tank placed across the top of the walls thereof, and containing water, which is retained in the tubes by the cap, which closes their lower ends, and also supports an inner tube for the purposes of circulation; and consists in certain conformation given the inner surface of the bottom of the cap by which the heating-surface is increased, the circulation accelerated, and the effectiveness of the whole apparatus increased.

Referring to the accompanying drawings, A is the cylindrical part of the cap, threaded in the usual way for attaching the outer tube E. B is the part usually given a trefoil shape, whose corrugations afford a hold for the wrench in screwing the caps on or off of the tubes. C is the inclined part for supporting the inner tube B centrally within and at a distance from the bottom of the cap F, which is formed up into a cone whose axis coincides with that of the inner tube.

I shall now proceed to describe the operation of my invention. The parts of the boiler all being in place and filled with water, and heat being applied externally to the outer tubes, the contents of the annular space between the outer and inner tubes rise and cause the contents of the inner tubes, which are resting upon the inclined surfaces of the cap, to flow downward. The apex of the cone in the bottom of the cap, which is coincident with the center of the downward flow, causes an equal distribution over the sides of the cone, which are so curved outward and upward as to return the current upward in the annular space between the tubes, as shown by arrow, with the least possible friction, the steam generated from the hot sides of the cone having the effect of increasing the motion, and thus accelerating the circulation, which it is obvious would not occur if the downward current was projected upon a flat surface, in which case the repellent action of the hot surface, and the efforts of the ascending globules of steam arising from the flat bottom of the cap, would be to retard the downward flow of the contents of the inner tube.

I am aware that caps to close the lower end of tubes in sectional boilers are not new, and that caps have been made with conical frogs to support the inner tubes, all of which I distinctly disclaim; but

What I do claim as my invention, and wish to secure as such by Letters Patent, is—

The lobed and screw-threaded cap, constructed with its bottom formed up into a hollow cone, whose axis shall coincide with the center of the inner tube, and whose inner surface shall curve outward and upward, and blend with the sides of the cap, said cap being rigidly attached to, and a continuation of, the outer tube, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 29th day of March, 1877.

ROBERT P. THOMPSON. [L. S.]

Witnesses:

FRANK F. THOMPSON,

J. DANIEL EBY.