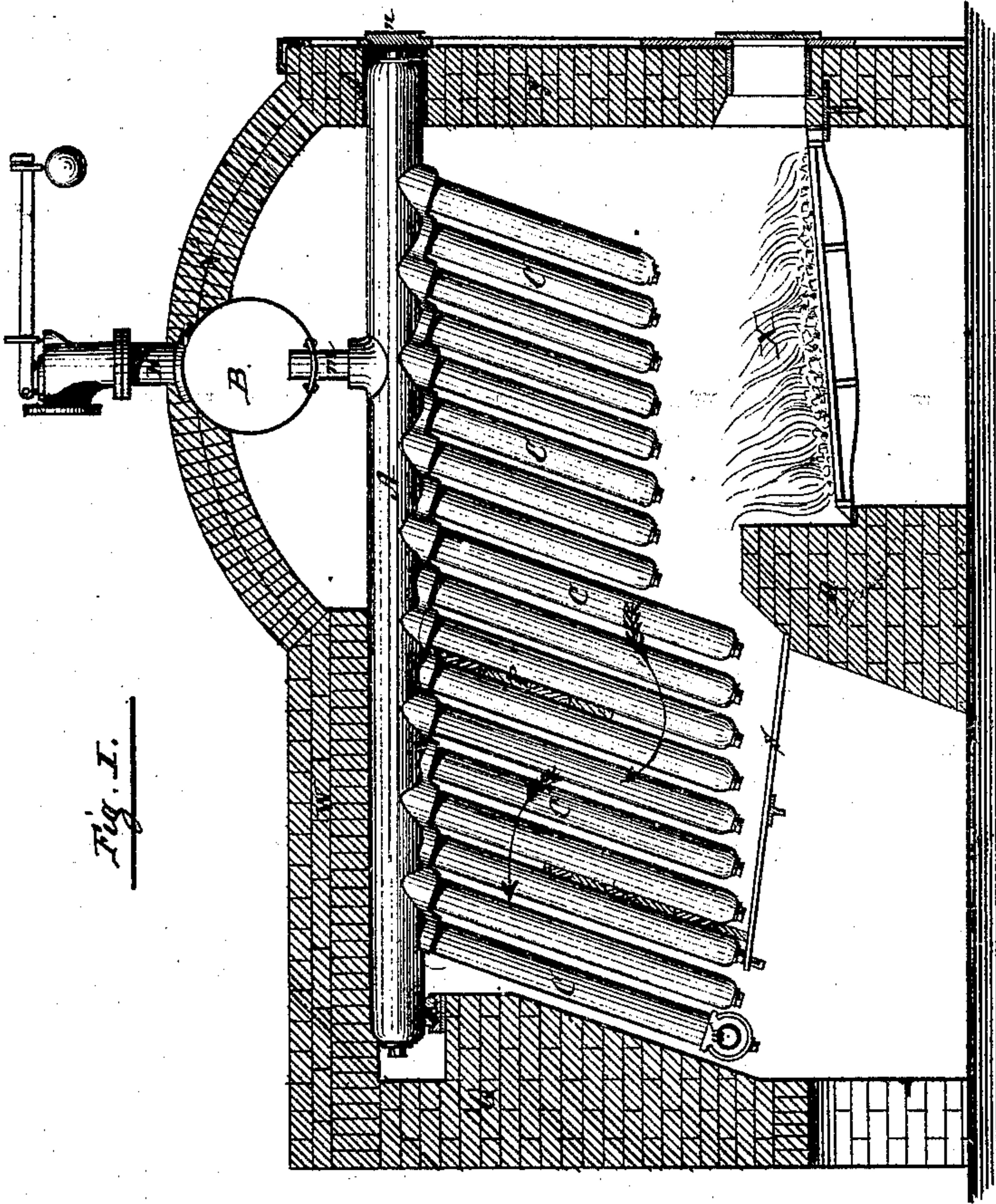
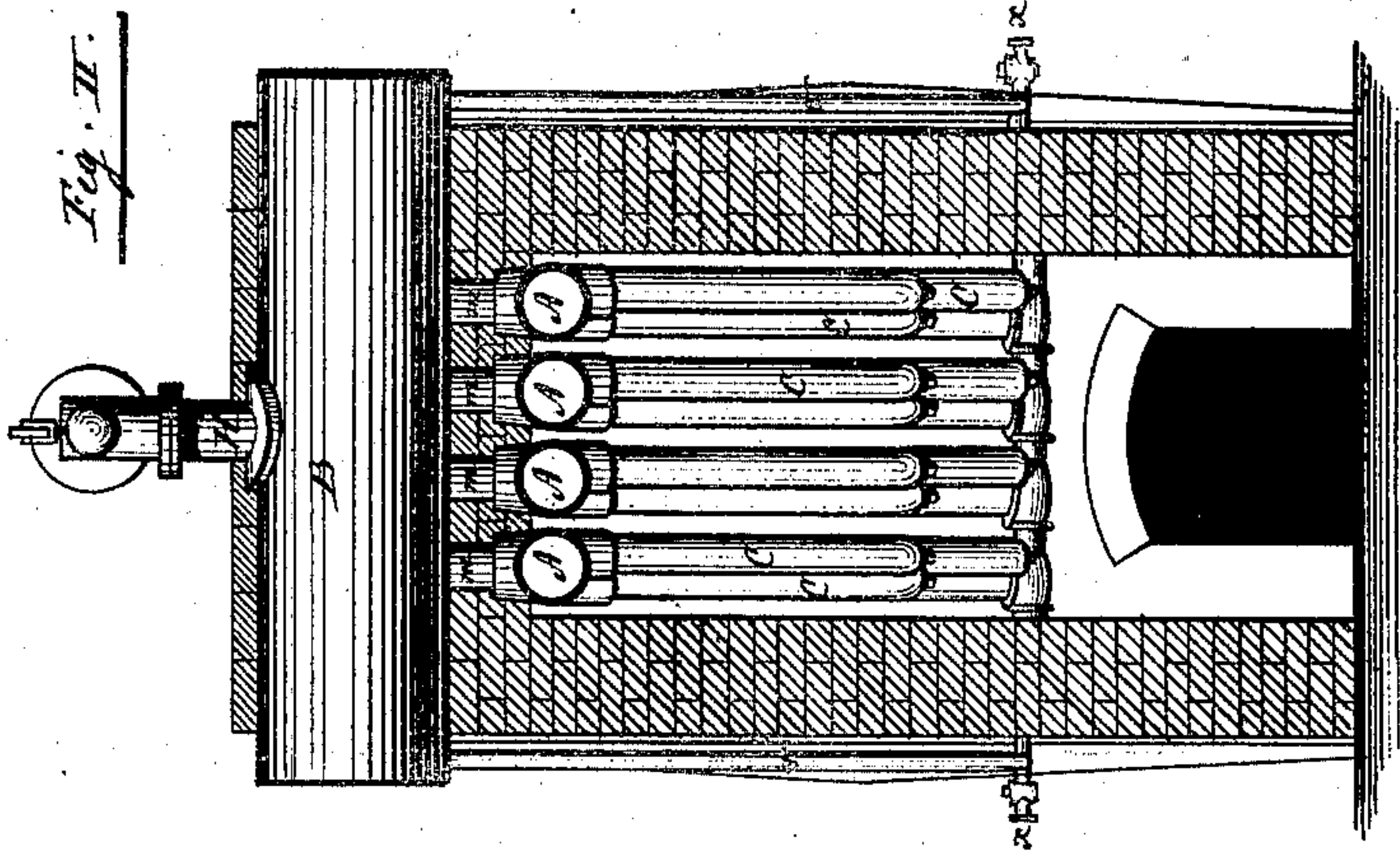


*J. F. Allen,*  
*Steam Generator.*  
*No. 113,613. Patented Apr. 11. 1871.*



*Witnesses*  
*Henry E. Packer*  
*Louis Schmalling*

*Inventor*  
*John F. Allen*



# UNITED STATES PATENT OFFICE.

JOHN F. ALLEN, OF NEW YORK, N. Y.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **113,613**, dated April 11, 1871.

*To all whom it may concern:*

Be it known that I, JOHN F. ALLEN, of New York, in the county and State of New York, have invented certain Improvements in Steam-Generators, of which the following is a specification:

Figure I represents a longitudinal section of a boiler embodying my invention, and Fig. II is a cross-section of the same.

Similar letters represent similar parts.

My invention consists in the arrangement of a series of oval or round chambers or tubes, A, running horizontally, or nearly so, the whole length of the boiler, and placed side by side, of any desired number.

The after ends of these tubes A rest on rollers *a*, or other suitable supports attached to the after or back brick wall, Q, to allow for the expansion of said pipes, while the forward ends of said tubes project partly through an opening, *d*, made in the front brick wall, *y*, and closed by a suitable plate, *n*, to give easy access to the tubes for the purpose of cleaning the same. Above these tubes A, and near their forward ends, a drum, B, is arranged, running crosswise, to the bottom of which the several tubes A are attached by means of nipples *m*, having right and left handed threads.

Small plates are riveted to the inside of the drum for the purpose of strengthening the same where the nipples enter.

Into the lower side of the chambers or tubes A pipes C are securely fastened, inclining backward at about twenty degrees inclination. These pipes C are welded circular at the bottom, and provided with a plug screwed into the ends for the purpose of cleaning the same.

Above and near the fire, or where most exposed to the direct action of the fire, these pipes C are made about four inches in diameter by four feet in length, or about in that proportion of area of tubes to surface exposed, and increase in length as the same are farther away from the direct effect of the fire.

By this arrangement of giving the tubes the above-mentioned inclination, and by making the same in the specified proportions, a per-

fect circulation will be obtained in these pipes without the necessity of placing any internal tubes or loose plates into the same for the purpose of creating the desired circulation.

The last row of the pipes C are connected together at their lower ends by means of right and left handed nipples *w*, so as to form a connection of the different sections, the extreme ends of said connection being connected, through the pipes *v v*, with the bottom of the drum B, whereby a perfect circulation between the different sections forming the steam-generator is obtained.

The pipes *v v* are provided with suitable cocks *x x*, for the purpose of using said pipes for feeding and blowing off the boiler.

On the bottom of one of the after rows of pipes C provisions are made for attaching the plate S, the forward end of which rests upon a projection on the back of the bridge-wall D. This plate S stops the downward draft and supports the brick wall J, situated near the after end of the boiler, between two rows of pipes, to cause the current of the draft to pass upward and over said brick wall J, as indicated by the arrow.

By this arrangement the gases, before entering the chimney, are caused to pass over and around the last rows of the pipes C, through which the cooler feed-water is made to enter, thereby extracting the heat from the escaping gases more effectively before entering the chimney by bringing them in contact with surfaces cooled by the cooler feed-water.

Some distance behind the bridge-wall D a partition-wall, P, running from the top wall, W, some distance downward, is suspended between two rows of pipes, regulating thereby the current of the flame and gases in the desired direction.

On the top of the drum B a steam-pipe, H, provided with the usual stop and safety valves, is arranged.

The top wall, W, of the brick-work inclosing the boiler is laid close upon the horizontal tubes A, with the exception of that part directly over the fire X, where an arch, V, is

thrown crosswise to the direction of the tubes A, inclosing the drum B, for the purpose of drying the steam in the drum B.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of horizontal tubes A with the inclined pipes C, substantially as and for the purpose hereinbefore described.

2. The combination of one of the last rows of pipes C, connections *w*, pipes *v*, and steam-

drum B, substantially in the manner and for the purpose described.

3. The combination of the horizontal tubes A, drum B, tubes C, and right and left threaded nipples *m* and *w*, substantially as and for the purpose herein set forth.

JOHN F. ALLEN.

Witnesses:

HENRY E. ROEDER,  
LOUIS SCHMULLING.