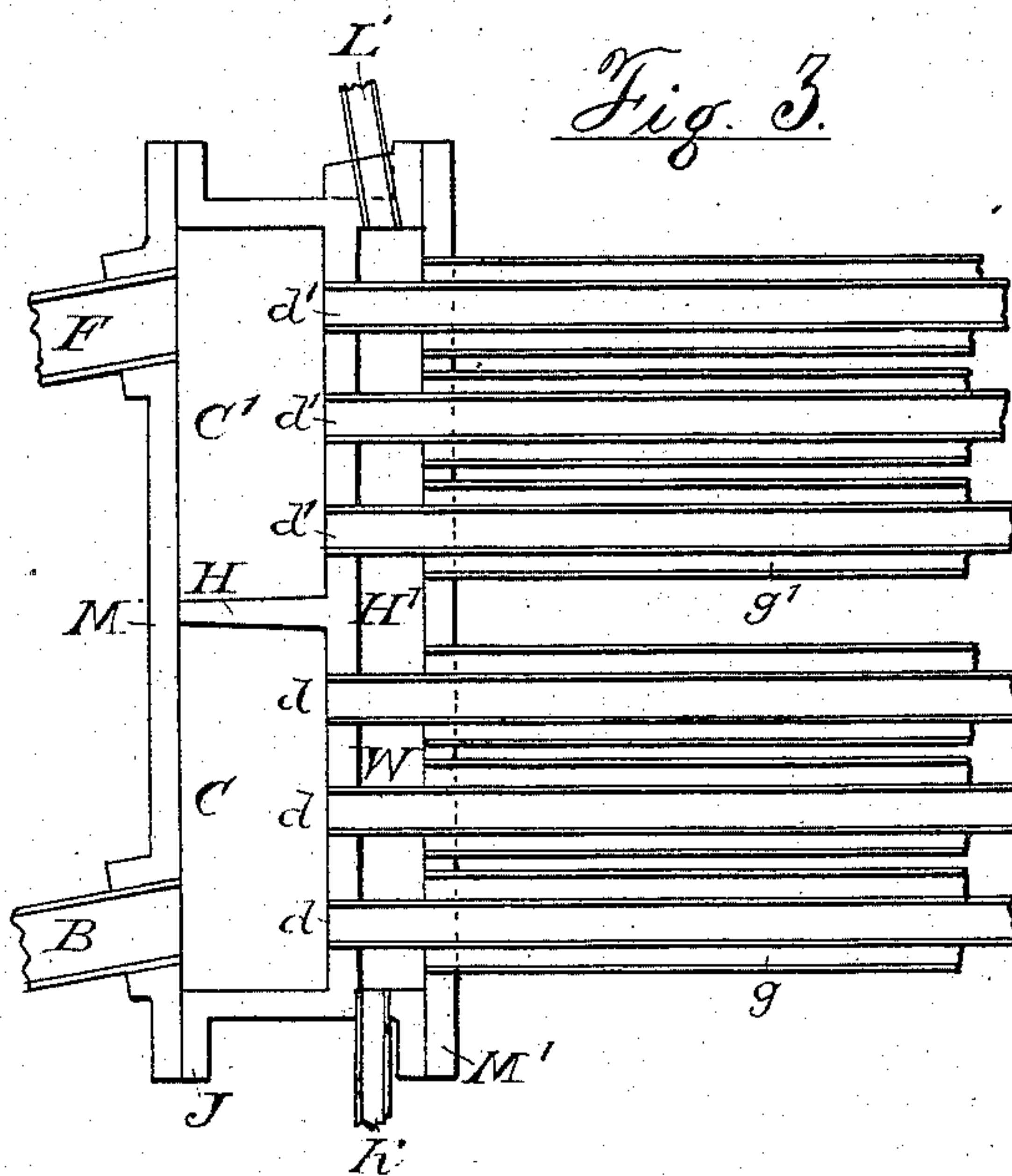
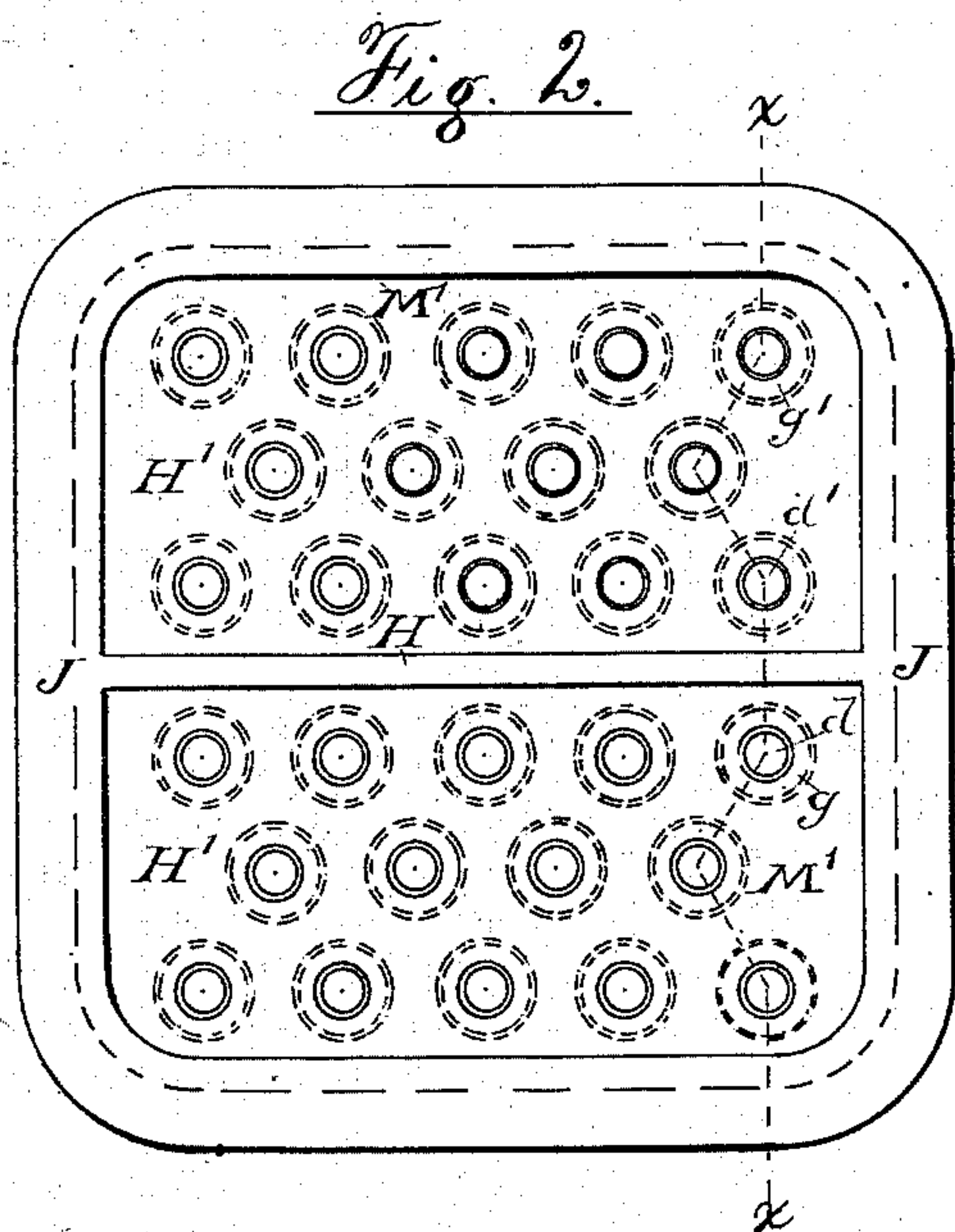
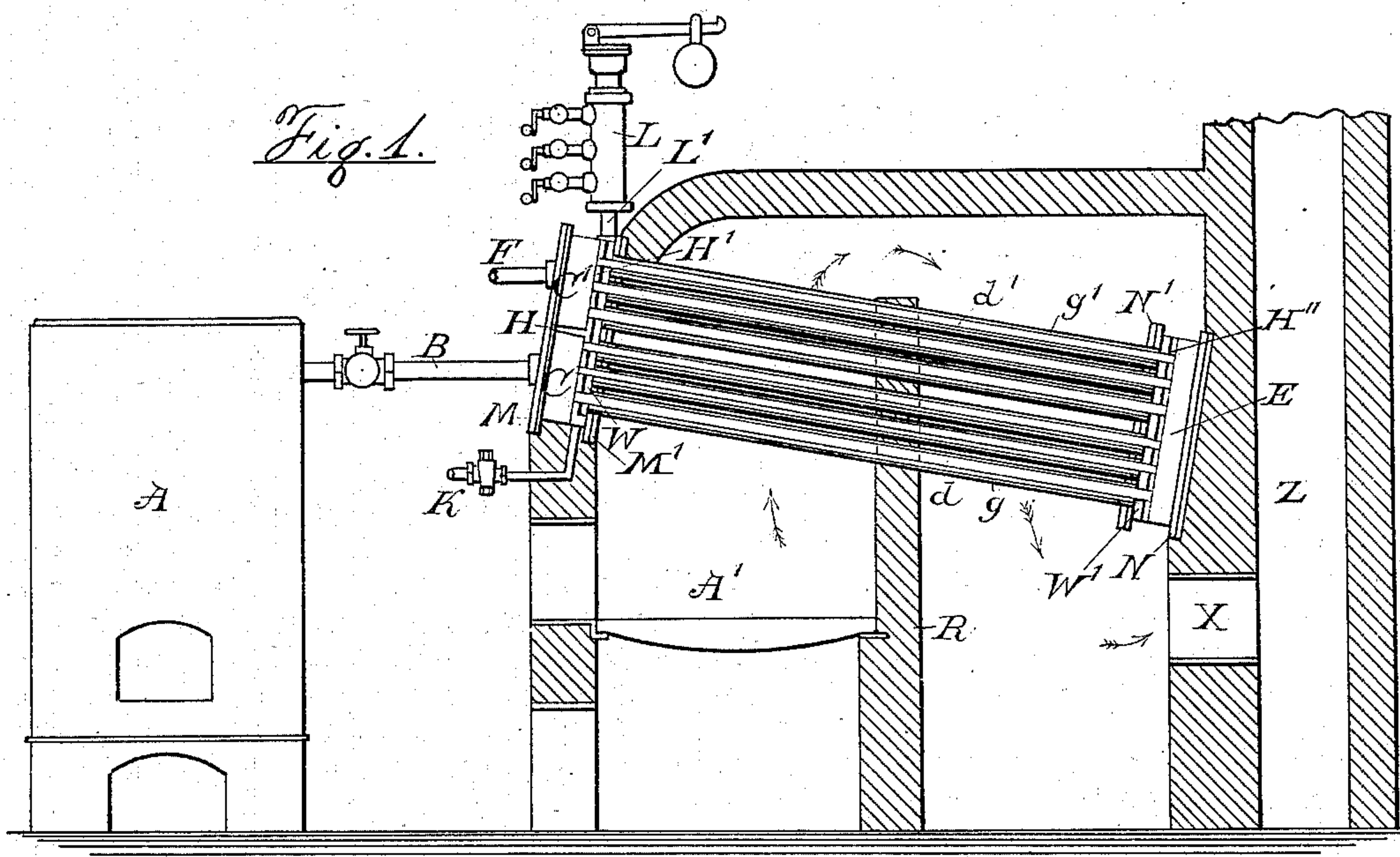


(No Model.)

W. H. BURNET.
STEAM SUPERHEATER.

No. 278,311.

Patented May 29, 1883.



Attest:

Abigail B. Tompkins.

E. L. Tompkins.

Inventor.

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By his Atty. Daniel F. Tompkins

UNITED STATES PATENT OFFICE.

WILLIAM H. BURNET, OF NEWARK, NEW JERSEY, ASSIGNOR TO JAMES YEREANCE, OF NEW YORK, N. Y.

STEAM-SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 278,311, dated May 29, 1883.

Application filed August 25, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BURNET, of the city of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Apparatus for Superheating Steam, of which the following is a specification.

The objects of my invention are, first, to provide a compact, economical, and effective arrangement for superheating steam by means of an inner tube surrounded by water, the water contained and inclosed in an outer tube, through which the inner tube is passed. The outer tube and water being heated by a furnace in the ordinary way, communicates the heat to the said inner tube, thereby effectually superheating the steam contained therein. Second, to economize the heat by the use of a double set of the said inner and outer tubes, with water inclosed in each of the said outer tubes, as already described, in connection with an upper and lower steam-chest in front and a single steam-chest at the back, so arranged that the steam, in the act of being superheated, passes from the front lower steam-chest through the inner tubes to the steam-chest at the back, and from thence through the upper inner tubes to the upper steam-chest in front, and from thence to the place of use or exit. Third, to further render effective and to economize the heat employed to superheat the steam in the apparatus by arranging the same in a chambered furnace, as shown in Figure 1, and hereinafter described. In order to attain these objects, I construct my said apparatus as illustrated in the accompanying drawings, in which—

Fig. 1 is a vertical and longitudinal section of the entire apparatus, including the boiler A, for generating the steam. The inner tubes, for superheating the steam, are shown at $d d d'$.

B is the steam-pipe for conducting the steam from the boiler A to the lower front steam-chest, C.

$g g g$ are the outer tubes, through which are passed the small or inner tubes, $d d d'$, in which the steam is superheated, and into which it passes from the lower steam-chest, C.

E is the single steam-chest at the back of the apparatus, into which the superheated steam passes from the lower inner tubes, $d d d'$. From E the superheated steam passes through the upper inner tubes, $d' d' d'$, which are inclosed by the outer water-tubes, $g' g' g'$, to the upper steam-chest, C', and from thence it passes through the pipe F to the place of use or exit.

H is a partition dividing the upper and lower steam-chambers, C and C'.

M is the front plate, and N the rear-plate, of the apparatus.

L' is a water-pipe connected with the column L, to which said column is attached the safety-valve and gage-cocks shown in Fig. 1. The water to fill the outer tubes, $g g g'$, surrounding the inner superheating steam-tubes, $d d d' d' d'$, is conducted into the apparatus through the pipe K, and from thence passes into and fills the space W shown in front and included between the partition H' and the disk M', and thence through the outer tubes, $g g g' g' g'$, it fills the space W' at the rear included between the disk N' and partition H''. The water communicating through the said tubes $g g g' g' g'$ and spaces W W' also fills the space contained in the column L, the height of the water in the apparatus being gaged by the cocks attached to L, as shown. The water surrounding the tubes $g g g$ and contained in the spaces W W' and column L is not consumed except as to whatever waste may occur, which said waste is constantly supplied and made good through the pipe K.

A' is the secondary furnace for superheating the steam. The heat from A', restrained by the partition R, ascends first in the direction indicated by the arrows around the outer tubes, $g g g' g' g'$, in front of the partition R. Thence the heat descends around the said tubes in rear of the said partition, as indicated by the arrows, and escapes through the flue X and chimney Z, effectually heating the said outer tubes, $g g g' g' g'$, and the water therein contained, which in turn superheats the steam in the inner tubes, $d d d' d' d'$.

Fig. 2 is a front view of the upper and lower

steam tubes, $d d d d' d' d'$, attached to the partition H' , and inclosed in the outer water-tubes, $g g g g' g' g'$, adjusted in the disk M' , and also showing the partition H , which divides the upper and lower steam-chests, $C C'$. J is the outer flange of the steam-chests $C C'$, to which the front plate, M , is attached. The dotted line $x x$ shows the relative position in end view of the tubes $d d d d' d' d'$ and $g g g g' g' g'$, being the same as shown in vertical section in Fig. 3.

Fig. 3 is a vertical section of the forward portion of the superheater, including the upper steam-chest, C' , and the lower steam-chest, C , and clearly showing the lower inner tubes, $d d d$, inclosed by the outer water-tubes $g g g$, also the upper inner tubes, $d' d' d'$, inclosed by the outer water-tubes $g' g' g'$, also showing the water-space W in front between the partition H' and the disk M' . M is the front plate of the apparatus, connected to the flange J of the steam-chests $C C'$. In the front plate, M , are fitted, as shown in the figure, the pipe B for the admission of the steam and the pipe F for the egress of the same. Also, at K is the pipe for the admission of the water into the space W , whence it passes into the outer tubes, $g g g g' g' g'$, and also through the pipe L' to the column L . (Not shown in the figure.) In place of steam, the vapors of naphtha or of other volatile fluids or atmospheric air may be employed and be introduced the same as steam through the pipe B into the inner tubes, $d d d d' d' d'$, and therein heated or superheated in like manner as steam.

The number of tubes, both inner and outer, to be employed in the apparatus will vary in

accordance with the amount and nature of the work required to be done.

The furnace A' , if desired, may be placed on the side of the apparatus in such a way that the heat shall first pass upward around a portion only of the tubes $g g g$ or $g' g' g'$, and thence descend around and among the remainder of the said tubes on the opposite side of the apparatus, and thence escape through the flue or chimney. When the furnace A' is thus arranged the partition R will be in a longitudinal position instead of being perpendicular, as shown in Fig. 1.

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

1. In an apparatus for superheating steam, the combination of the inner tubes, $d d'$, and outer tubes, $g g'$, with the steam-chests $C C' E$, substantially in the manner and for the purpose described.

2. The combination of the tubes $d d d d' d' d'$ $g g g g' g' g'$, steam-chests $C C' E$, and water-spaces $W W'$, substantially in the manner and for the purpose described.

3. The combination of the tubes $d d d d' d' d'$ $g g g g' g' g'$, steam-chests $C C' E$, water-spaces $W W'$, and water-column L , substantially in the manner and for the purpose described.

4. In an apparatus for superheating steam, the boiler A and secondary furnace A' , in combination with the tubes $d d'$, steam-chests $C E$, and water-spaces $W W'$, substantially in the manner and for the purpose described.

WILLIAM H. BURNET.

Witnesses:

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