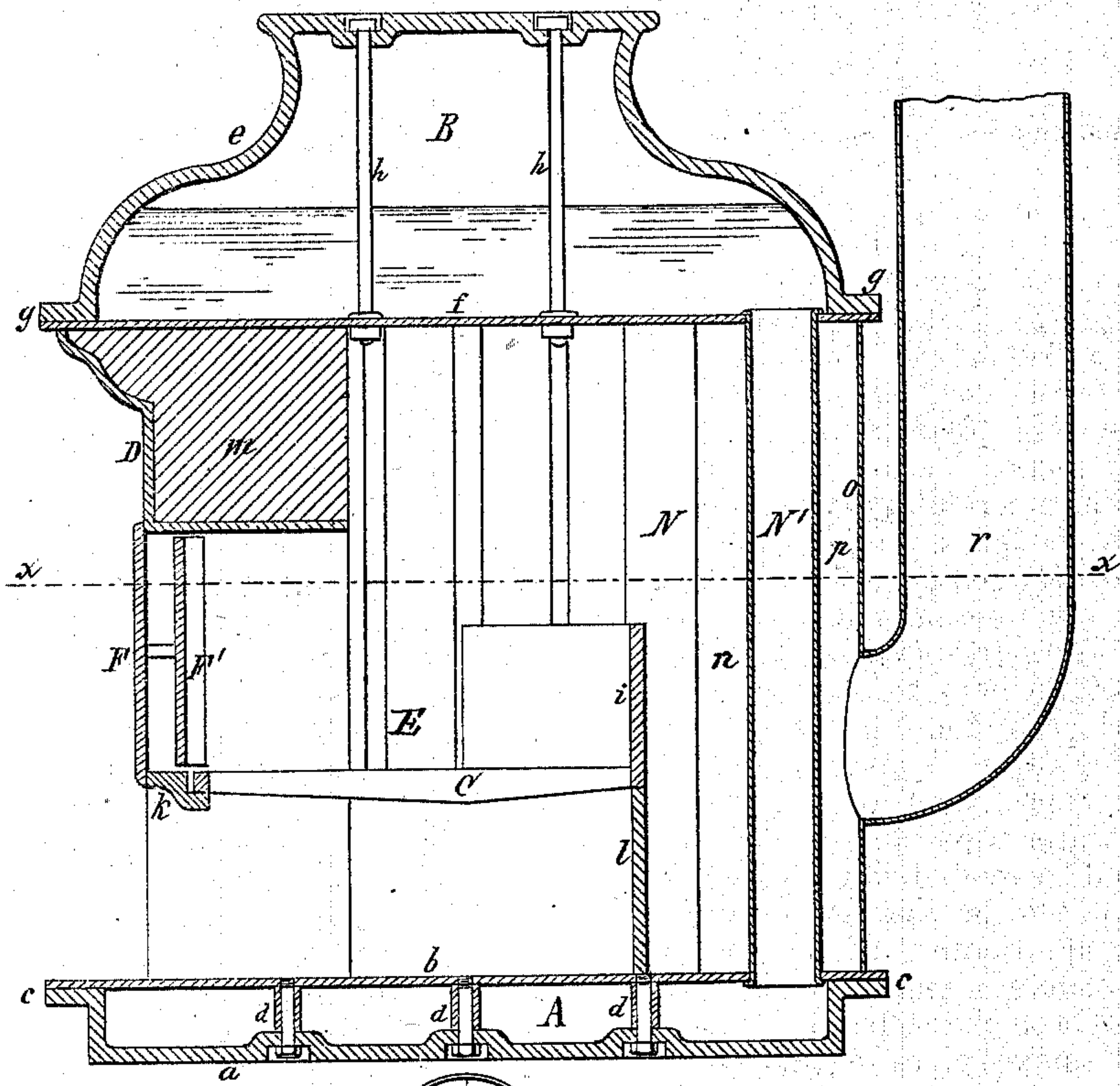


**O. W. ALLISON.**  
**Steam Boilers.**

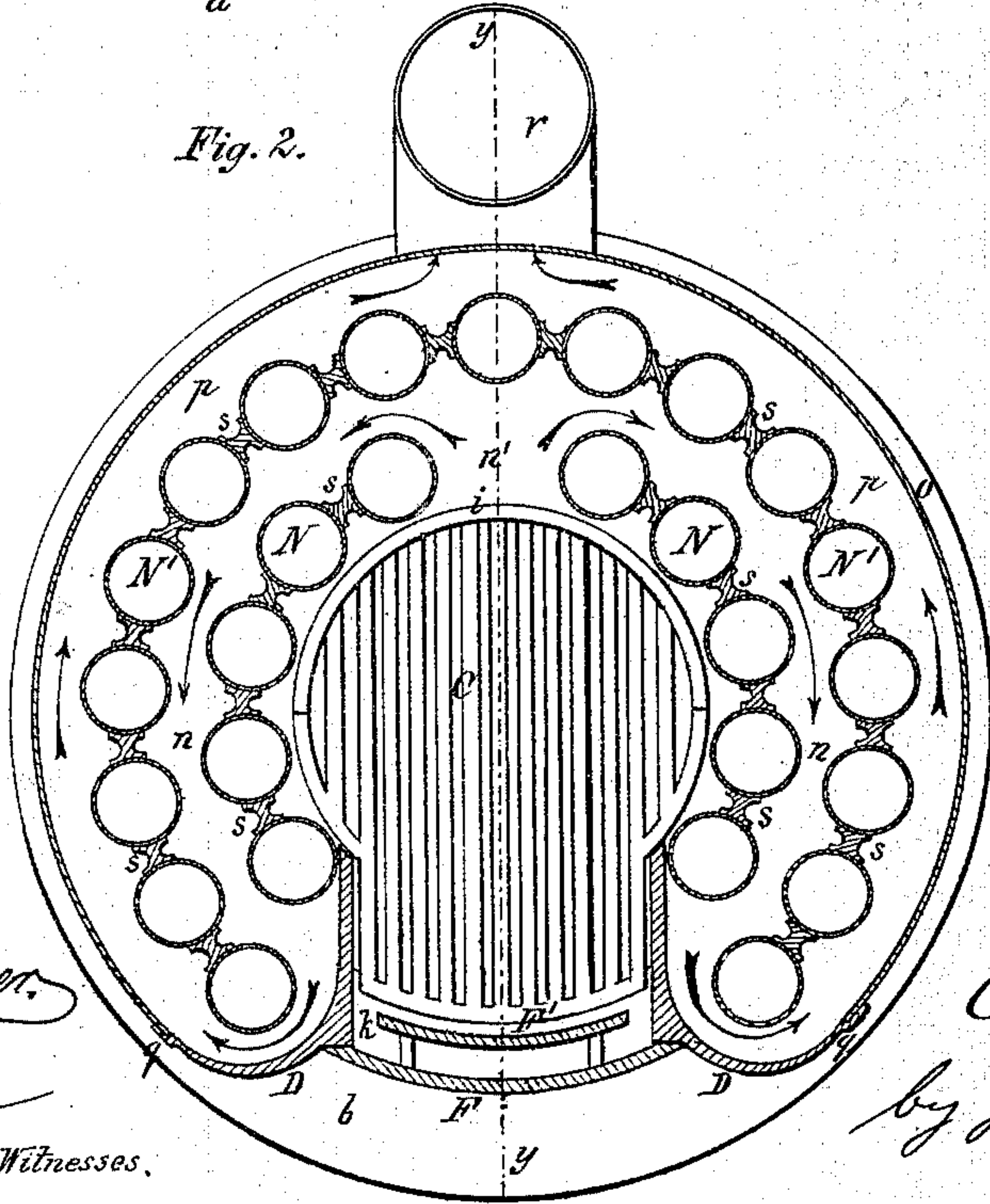
No. 146,039.



Patented Dec. 30, 1873.

*Fig. 1.*



*Fig. 2.*



  
 Jno. J. Bonner.  
  
 Edward Mithelm

*Witnesses,*

O. W. Allison  
Inventor  
by Jay Hyatt  
City.



# UNITED STATES PATENT OFFICE.

OSCAR W. ALLISON, OF BUFFALO, NEW YORK, ASSIGNOR OF ONE-HALF  
HIS RIGHT TO ROBERT DEMPSTER, OF SAME PLACE.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 146,039, dated December 30, 1873; application filed  
November 24, 1873.

*To all whom it may concern:*

Be it known that I, OSCAR W. ALLISON, of the city of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Steam-Boilers, of which the following is a specification:

My invention relates more especially to portable steam-boilers having vertical water-tubes arranged between a water-chamber below and a steam-chamber above, and generally combined with a portable steam-engine secured to the top of the boiler. The invention consists, first, in the combination, with a boiler having a steam and water chamber arranged one above the other, and a central furnace, of a series of vertical water-tubes arranged around said furnace, and provided with connecting space-blocks, filling the spaces between the tubes, whereby the products of combustion are compelled to travel along the entire series of said tubes on both sides before they can escape into the smoke-pipe; second, in the arrangement, in a boiler having a steam and water chamber and central furnace, of an outer series of water-tubes, connected by space-blocks, and two inner series of similar tubes connected by space-blocks, so as to form flues between the same, through which the products of combustion are made to pass in their way to the smoke-pipe; third, in the combination, in a vertical steam-boiler, and with the water-tubes thereof, of connecting cast-iron space-blocks, made concave at the sides to fit snugly between the tubes, whereby said blocks are held securely in place and the spaces between the tubes closed.

In the accompanying drawing, Figure 1 is a sectional elevation of my improved boiler in line *y y*, Fig. 2. Fig. 2 is a horizontal section in line *x x*, Fig. 1.

Like letters designate like parts in each of the figures.

A represents the lower water-chamber, consisting of a cast base portion, *a*, of flat cylindrical shape, and a tube-sheet, *b*, connected by flanges *c* and stay-bolts *d* in a common manner. B represents the upper steam-chamber, composed of a cast top portion, *e*, and a tube-sheet, *f*, connected by flanges *g* and stay-

bolts *h*. The cast portion *e* is formed flat at the top to receive the bed-plate of a steam-engine, which is bolted thereto. C is the grate of the furnace E, arranged centrally in the boiler, and provided at the rear with an upwardly-projecting shield, *i*, for confining the fuel and preventing injury to the water-tubes in using the poker. D represents the cast front of the furnace, resting on the tube-sheet *b*, and fitting under the tube-sheet *f* of the steam-chamber. F is the fire-door, provided with a protecting-shield, *F'*. The grate C rests at the front upon a cross-piece, *k*, of the front D, and at the rear upon a curved plate, *l*. The space above the feed-opening of the furnace is filled with brick or other suitable non-conducting material, as shown at *m*. N represents a series of vertical water-tubes arranged concentrically around the furnace, and connected by space-blocks *s*, so as to form a continuous surface. The sides of the space-blocks adjacent to the tubes are shaped to conform to the curvature thereof, whereby they are securely held in place, and the spaces between the tubes tightly closed.

I am aware that round rods have been used; but they are liable to contortion, so that they will not form a perfect joint with the tubes, and hence they are less efficient than the space-blocks.

The products of combustion from the furnace are thereby made to travel along the entire series of tubes on both sides before they can escape into the smoke-pipe. N' N' represent two similar series of water-tubes, also connected by space-blocks *s*, and arranged between the series of tubes N and the furnace, so as to form two flues, *n n'*, between them and the outer row N, into which the gases from the furnace enter through a central opening, *n''*, left between the two series of tubes N'. O is the outer shell, arranged concentric with the row of tubes N, and at some distance therefrom, so as to form a flue, *p*, between them. The shell O connects with the front D, as shown at *g*, and is provided at the rear with a smoke-pipe, *r*.

In constructing my improved boiler, the tubes N N' and space-blocks *s* are inserted and



secured alternately, or first a tube and then a space-block. The course of the heated air and products of combustion from the furnace to the smoke-pipe is indicated by arrows in Fig. 2. The outer shell O is not necessarily secured to the chambers A and B, but may simply be snugly fitted between the same.

Suitable openings are arranged in the shell O and front D, through which the flues  $n$ ,  $n^1$ , and  $p$  may be cleaned, when required.

My improved boiler is very efficient and easily managed, and can be constructed at comparatively small expense.

I claim as my invention—

1. The combination, in a steam-boiler, with the water-chamber A, steam-chamber B, and furnace E, of the series of water-tubes N and

connecting space-blocks, substantially as and for the purpose hereinbefore set forth.

2. The arrangement, in a steam-boiler having a water-chamber, A, steam-chamber B, and furnace E, of the outer series of water-tubes N and two inner series,  $N'$   $N'$ , and connecting space-blocks, substantially as set forth.

3. The combination, in a vertical steam-boiler, and with the water-tubes thereof, of the connecting space-blocks  $s$ , made concave at the sides to fit between said tubes, substantially as and for the purpose hereinbefore set forth.

OSCAR W. ALLISON.

Witnesses:

JNO. J. BONNER,

EDWARD WILHELM.